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THE NATIONAL POTATO-BREEDING PROGRAM, 1958

By
Robert V. Akeley and Others
and
State Cooperators

(Twenty-Ninth Annual Report to Cooperators)
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PLANT INDUSTRY STATION (Beltsville, Md.) and CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine)

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G. V. C. Houghland and E. S. Schultz

Plant Industry Station

At Plant Industry Station, Beltsville, Md., in 1958 the crossing and selfing was carried out in the usual manner. The ideal weather conditions that prevailed throughout the pollination period aided greatly in obtaining 415 new lines varying from 50 to 1500 seeds per line. The following disease-resistant factors were involved: late blight, scab, ring rot, leaf roll, verticillium wilt, brown rot, net necrosis (leaf roll), corky ring spot; viruses X, A, Y, and S; and insect resistance to leafhoppers and nematodes. The main horticultural factors of the parents such as tuber shape, skin color (red, white, and russet), and percentage of total solids were taken into consideration as well as the natural fertility and maturity of the parents. Approximately 57,000 new seedlings were grown in our greenhouses and tubers and seed were distributed to cooperators from Maine to Washington and Texas, and also Colombia and Mexico.

Distribution

The distribution of potato seed, new seedlings, and tubers of named and numbered varieties was continued. A summary of the shipments is given in P. I. tables 1, 2, and 3. The seed, new seedlings, and small lots were sent from Plant Industry Station, but many of the larger shipments were made directly from Presque Isle, Maine.

P. I. table 1. Distribution of potato seed and new seedlings from greenhouse at Beltsville, Md., 1958.

Country or State	Cooperator	Number of progenies	Number	
			Tubers	Seeds
California	G. N. Davis	27		10,000
Colombia	N. Estrada	7	1,026	
Iowa	A. E. Kehr	33	5,617	
Korea	D. W. Kim	36		7,500
Louisiana	T. P. Dykstra	35		14,670

P. I. table 1. (Continued)

Country or State	Cooperator	Number of progenies	Number Tubers	Number Seeds
Louisiana	T. P. Dykstra	26	4,691	
Maine	R. Bonde	13		1,300
Maine	A. E. Schark	151	35,769	
Maine	R. Bonde	17	1,751	
Maine	G. W. Simpson	36	4,973	
Mexico	J. S. Niederhauser	23	3,025	
Ohio	J. P. Sleesman	5	1,566	
South Africa	J. E. Van der Plank	5		840
Texas	W. B. Cook	12	4,075	
Washington	W. G. Hoyman	17		10,000
Washington	W. G. Hoyman	43	5,173	
West Virginia	K. C. Westover	8	1,996	
Wisconsin	F. J. Stevenson	38	7,238	
Wisconsin	R. H. Larson	8		1,600

P. I. table 2. Distribution of named and numbered varieties to foreign countries, 1958.

Country	Cooperator	Number of varieties
Argentina	D. R. Pasquale	13
Australia	W. Poggendorff	6
Australia	D. W. Powell	2
Belgium	N. Rigot	14
Belgian Congo	H. H. Fisher	12
Brazil	F. F. Guimaraes	25
Canada	G. R. Johnston	23
Egypt	A. A. Mours	7
Israel	N. Kedar	5
Mexico	H. H. Fisher	1
Netherlands	H. T. Wiersema	13
"	J. D. Bekins	2
"	A. Wolf	1
New Zealand	T. A. Penn	14
"	R. G. Robinson	3
Southern Rhodesia	V. J. Montague	2
South Africa	L. L. Roux	1
Taiwan	Chi-Chang Hwang	20

P. I. table 3. Distribution of named and numbered varieties to Territories and States.

Territory or State	Cooperator	Number of varieties
California	G. N. Davis	14
California	W. A. Wendt	1
Colorado	J. G. McLean	12
Colorado	J. Weigle	4
Connecticut	A. Hawkins	11
Connecticut	R. K. Wood	1
Connecticut	L. Edgington	3
Delaware	E. P. Brasher	9
Florida	W. T. Scudder	15
Florida	A. H. Eddins	15
Florida	E. N. McCubbin	18
Georgia	J. E. Bailey	14
Illinois	J. P. McCollum	3
Indiana	H. T. Erickson	3
Iowa	A. E. Kehr	231
Kentucky	C. C. Singletary	15
Maine	R. E. Webb	1,750
Maine	A. E. Schark	87
Maine	R. Bonde	5
Maryland	W. Smith	4
Maryland	P. Heinze	21
Massachusetts	K. J. Ucinski	10
Massachusetts	R. A. Mullany	8
Michigan	N. R. Thompson	3
Michigan	E. J. Wheeler	27
Michigan	M. L. Anderson	1
Minnesota	F. J. Laver	3
Minnesota	C. Turnquist	28
Minnesota	C. J. Eide	27
Missouri	U. N. Lambeth	3
Nebraska	H. O. Werner	3
New Jersey	J. C. Campbell	241
New York	E. E. Ewing	17
New York	R. L. Sawyer	9
New York	L. C. Peterson	118
New York	F. L. McLean	1
New York	S. A. Alfieri, Jr.	1
New York	W. C. Kelly	1,629
New York	R. L. Plaisted	12
New York	W. A. Heins	9
North Carolina	F. Haynes	1
North Dakota	A. Benson	1
North Dakota	R. H. Johansen	34
North Dakota	W. G. Hoyman	4
North Dakota	C. Cotrufro	5
Ohio	F. Lower	11

P. I. table 3. (Continued)

State	Cooperator	Number of varieties
Ohio	J. P. Sleesman	28
Ohio	W. N. Brown	3
Pennsylvania	J. D. Harrington	9
Rhode Island	J. Sheehan	20
South Carolina	W. C. Barnes	14
South Dakota	C. M. Nagel	21
Texas	W. B. Cook	415
Texas	J. M. Coruthers	24
Texas	P. W. Leeper	28
Virginia	F. S. Andrews	17
Virginia	M. M. Parker	12
Washington	E. D. Bufmyer	3
Washington	W. G. Hoyman	30
Wisconsin	G. H. Rieman	32
Wisconsin	F. J. Stevenson	9
Wisconsin	R. H. Larson	7
Wisconsin	C. H. Walkinshaw	2
Wisconsin	A. J. Hansen	2
Wyoming	J. R. Vaughn	27

Chapman Farm, Maine

Forty promising selections and 7 varieties were increased in varying amounts on the Chapman Farm. The selections are being evaluated for yielding ability, percentages of total solids, and chipping and frying qualities.

A summary of the maturity and fertility data on the 10-hill rows grown on the Chapman Farm in 1958 is given in P. I. table 4. The fertility in the field is measured by the relative number of seedballs produced per plant. A total of 1124 selections (10-hill rows) were grown in 1958. About 73 percent were judged early or medium in maturity and 25 percent, good to medium in fertility. Approximately 32 percent of the 10-hill rows were selected for parents, for distribution to cooperators, or for future tests in 1959.

P. I. table 4. Maturity and fertility of seedlings grown in 10-hill rows on Chapman Farm, 1958.

Maturity classes	Seedlings		Fertility 1/ classes	Seedlings	
	No.	Pct.		No.	Pct.
Early	360	32.0	None	593	53.5
Medium	465	41.4	Slight	241	21.8
Late	275	24.5	Medium	258	23.3
Very late	24	2.1	Good	16	1.4
TOTAL	1124	100.0		1108	100.0

1/ Based on the relative number of seedballs set in the field.

Approximately 32,948 seedlings representing 143 families grown in the greenhouse in Beltsville, Md., were planted for increase and selection on the Chapman Farm. The germination of the seedlings averaged 96 percent. Approximately 3 percent (1053 seedlings) were selected at harvesttime for increase in 10-hill rows and inclusion in 10 or more different disease and quality tests in 1959 (P. I. table 5).

P. I. table 5. Single-hill seedlings grown on the Chapman Farm in 1958, showing the total number planted, grown, selected and the number of selections reserved for future tests in 1959.

Planted	Grown	Selected	Late Blight	Scab	Ring Rot	Viruses A	Viruses X	Viruses Y	Leaf roll	Vert. Wilt	Golden Nematode	Net Necrosis
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
32,948	31,570	1053	731	810	253	621	224	331	120	399	132	101

The outstanding parent this year, measured by the number of seedlings selected, was B2368-4. It is a red selection with scab resistance and extreme vigor. Approximately 183 selects (17 percent) of the total selections made had B2368-4 as one of the parents. Two other good parents were B3139-24 and B3944-11. Seedling B3139-24 is resistant to late blight, scab, ring rot, verticillium wilt and virus Y and B3944-11 is resistant to Golden Nematode.

Aroostook Farm, Presque Isle, Maine

The growing season for 1958 in northern Maine began with fine planting weather. Shortly afterward the weather turned cold and wet resulting in considerable seedpiece decay. Several seedling varieties including B75-4 and 50B9-8 produced very low yields due to poor stands caused by adverse weather conditions. Rainfall for the growing season was higher than normal but not sufficiently higher to cause serious delay in the regular cultural and harvesting operations.

Approximately 124 varieties and promising seedlings were grown in the Aroostook Farm increase plots. An additional 465 varieties and selections were grown for observation, distribution, or to be used as parents in a breeding plot. The Variety Collection planted each year in 20-hill rows contained 85 new and old American varieties.

All of the plots were planted between the 6th and 22nd of May. Eleven hundred pounds of 10-15-15 fertilizer were applied to all plots at planting time. A weekly spray consisting of Dithane and DDT was used on all plots from July 1 to September 2. On August 5 and 26, Parathion was added to the spray mixture. Early harvesting was delayed at Chapman by wet weather. The vines of the varieties in all the yield trials except the verticillium wilt test were sprayed with sodium arsenate on September 9 after a rotobeater had been used. The yield tests were harvested September 14 to 21.

Yield Tests

Twenty-three early- maturing seedlings were compared in yielding ability and solids content with Cherokee and Irish Cobbler. The data for this test are tabulated in P. I. table 6. The varieties are listed according to decreasing yields in hundred-weights and bushels per acre. The first 9 yields, including the check Cherokee, are alike statistically. B3454-5, a red selection with scab resistance, has given high yields for 2 years, but it is very low in dry-matter content. B4094-23 is an early-maturing russet seedling that may have some commercial promise. The low yield of B75-4 was due to a very poor stand. Seedling B3391-2, highly resistant to leaf roll in Maine, yielded 592 bushels of U.S. No. 1 tubers per acre with 21.6 percent total solids.

P. I. table 6. Early-maturing variety yield test, Aroostook Farm, Presque Isle, Maine, 1958.

Variety	U. S. No. 1 tubers per acre	Per acre		Average weight	Solids
	Cwt.	Bu.	Pct.	Oz.	Pct.
B 4128-1	432	720	93	5.0	18.8
F 4631	424	707	96	6.2	19.6
B 3641-15	423	706	96	7.5	20.4
Cherokee	408	679	97	6.0	19.3
F 4713	402	670	98	7.5	20.4
B 3140-36	401	669	95	5.8	18.8
F 503	392	653	96	6.5	20.2
B 3454-5	391	652	96	6.0	18.7
B 605-10	391	652	97	5.5	19.4
Irish Cobbler	388	647	94	5.3	20.1
Ia 1092-2	385	641	98	7.2	19.8
B 4094-23	376	627	98	7.2	18.0
Tawa	371	618	95	6.2	18.9
B 3584-5	368	613	95	5.3	18.5
B 3556-11	362	603	92	5.4	23.2
B 3400-1	360	600	96	6.4	17.8
Ia 1109-9	362	603	92	5.2	20.9
B 2971014	356	593	94	5.9	21.6
B 3391-2	355	592	89	4.5	21.6
B 4116-2	349	581	96	6.1	19.6
Keswick	344	573	97	6.4	20.4
Osage	342	570	97	7.6	20.5
CS 11889	246	410	93	4.5	19.5
CS 11888	207	344	92	5.3	19.0
B 75-4	134	223	97	4.9	20.4
L.S.D. .05 level	42	71			1.1

Sixteen medium-maturing selections and 4 varieties were compared for yielding ability and total solids in P. I. table 7. Seedling B2368-4, a red selection with scab resistance, yielded significantly higher than any of the others in this test. It also had the highest percent and largest size of U. S. No. 1 tubers but ranked 11 in total solids. Selection Ia 1111-8 had the highest percentage for total solids but ranked 13 in yield. La 3769 was second in yielding ability in 1958 and first in 1957. It has resistance to late blight and scab.

P. I. table 7. Medium-maturity variety yield test, Aroostook Farm, Presque Isle, Maine, 1958.

Variety	U. S. No. 1 tubers per acre			Average weight	Solids
	Cwt.	Bu.	Pct.		
B 2368-4	515	858	98	10.0	18.0
La 3769	436	727	95	7.4	15.8
Katahdin	426	710	96	6.8	19.6
B 73-3	411	684	97	7.2	21.1
Chippewa	406	677	94	5.3	17.0
B 3604-1	401	669	93	5.2	18.9
Onaway	398	664	97	7.3	17.4
Ia 1111-5	395	658	96	6.6	21.2
Rushmore	386	643	96	8.3	18.2
B 3424-11	371	618	95	6.0	18.6
F 4631	368	613	97	6.9	18.8
B 3299-13	365	609	97	6.5	19.5
Ia 1111-8	360	600	94	4.9	22.6
B 4113-4	348	580	96	5.6	16.6
B 3653-15	323	538	79	4.8	20.1
B 3856-8	322	537	91	4.6	20.0
F 5080	319	532	97	6.7	21.4
B 3114-52	314	523	96	6.1	18.0
B 4094-19	301	501	96	6.2	17.1
B 3873-5	246	411	89	4.6	17.7
L.S.D. .05 level	53	89			1.2

Eleven late-maturing seedlings and the varieties Huron, Canso, Sebago, Red LaSoda, and Green Mountain were compared in yielding ability and solids content. The two highest yielding seedlings, La 3769 and B 2894-24 do not differ significantly in yield but their percentages of total solids are significantly different (P. I. table 8). La 3769 was entered in both the early- and late-maturing yield tests and was outstanding in yield in each test. The red seedling B 2368-13, a sib of B 2368-4, produced an excellent yield of 687 bushels per acre and a total solids rating of 19.8 percent. It has scab resistance. Green Mountain was the highest in total solids of the late-maturing varieties with a percentage rating of 21.8 percent but its yield was lower than normal for this variety.

P. I. table 8. Late-maturity variety yield test, Aroostook Farm, Presque Isle, Maine, 1958.

Variety	U. S. No. 1 tubers per acre				Solids
	Per acre			Average weight	
	Cwt.	Bu.	Pct.	Oz.	Pct.
La 3769	477	795	96.9	7.8	17.5
B 2894-24	435	726	96.8	7.9	19.2
F 5025	422	703	92.6	6.1	20.1
B 2368-13	412	687	96.5	8.4	19.8
La 4112	411	684	97.8	9.1	18.7
F 4713	400	667	97.7	6.9	20.0
B 3516-11	390	650	98.5	10.6	18.7
Huron	390	650	92.6	5.5	21.0
Sebago	390	650	95.9	6.4	19.9
Green Mountain	380	633	95.6	6.3	21.8
Red LaSoda	369	415	94.6	6.7	18.1
B 3453-2	351	584	90.3	4.6	20.0
Canso	349	581	95.5	6.1	20.5
La 1859	346	576	95.1	7.4	17.8
B 3424-11	324	540	78.7	4.1	19.8
F 5294	271	452	97.9	9.5	19.7
L.S.D. .05 level	54	91			0.8

Eight seedlings and 8 regular varieties were compared in yielding ability in P. I. table 9. There were no significant differences in yield between Saco and the next four varieties listed in order of yield. Saco also had the highest average tuber weight and percentage of total solids. Seedlings B 3352-8 and B 3353-9 are resistant to late blight and ring rot. B 3352-8 also has verticillium wilt resistance and its yield of 744 bushels per acre and solids content of 20.4 percent compare favorably with those for Saco.

P. I. table 9. Mixed-maturity variety yield test, Aroostook Farm, Presque Isle, Maine, 1958.

Variety	U. S. No. 1 tubers per acre				Solids
	Per acre			Average weight	
	Cwt.	Bu.	Pct.	Oz.	Pct.
Saco	455	755	96	7.2	20.7
B 3352-8	446	744	96	6.3	20.4
B 3353-9	420	699	96	6.8	18.0
Green Mountain	410	684	96	6.6	19.1
Cherokee	401	669	95	6.0	19.5
Chippewa	398	664	94	6.0	17.4
B 3454-5	389	649	95	5.5	18.6
Katahdin	386	643	96	6.5	18.9
Irish Cobbler	379	632	92	5.3	19.9
Teton	377	629	95	5.8	19.4
Sebago	370	616	95	6.3	19.2
B 3876-25	364	607	91	5.4	18.4
B 3604-19	352	587	96	6.4	19.2
B 3428-20	318	530	91	4.5	17.9
B 2858-5	292	487	90	5.6	20.3
B 3454-14	267	444	84	4.8	17.3
L.S.D. .05 level	54	90			1.7

Quality Studies

The potato chip and french fry incides of potato varieties entered in the variety yield trials last year are presented in P. I. table 10. Yields and total solids of these varieties are listed on pages 9 and 10 of the National Potato Breeding Report for 1957. After harvest, a 20-tuber sample from each replicate in the yield tests was saved for quality determinations. The average specific gravity of the 20 tuber samples, from which total solids were estimated, was taken in October. One 5-tuber sample was selected to make potato chips and french fries in November. These samples were stored at 50° F. between harvest and the time of the fry tests. A second and third 5-tuber sample, and 30 tubers of the variety Kennebec, were stored at 38° F. until the last week in January. At that time one of the 5-tuber samples, and the sample of Kennebec, were removed to a 60° F. room for conditioning.

P. I. table 10. Potato chip and french fry indices of potato varieties in the 1957 yield tests. 1,2/

Variety	Maturity	Potato Chips: After harvest	Potato Chips: 38° F. storage and conditioned	French fries: After harvest	French fries: 38° F. storage and conditioned
B 3428-14	E	3.8	5.7	3.5	5.3
Cherokee	E	6.1	8.1	5.6	7.1
B 3622-4	E	6.2	7.9	5.5	6.9
Irish Cobbler	E	6.3	7.1	6.0	6.9
CS 11888	E	6.7	10.0	5.3	8.4
F 4631	E	6.7	6.0	5.5	6.6
F 5080	E	7.2	8.4	6.1	8.2
B 3604-19	E	7.3	10.0	6.7	9.9
CS 11889	E	7.8	8.6	6.5	7.7
B 2922-26	E	8.2	10.0	8.1	10.0
B 3454-14	E	8.8	10.0	7.4	8.6
B 3140-36	E	8.8	10.0	8.3	10.0
B 3454-5	E	9.7	10.0	8.2	9.2
La 4112	M	5.3	5.4	4.2	4.4
Osage	M	4.4	8.5	4.0	7.9
Dazoc	M	7.0	8.1	4.8	6.7
B 3353-9	M	7.7	10.0	5.5	9.8
Chippewa	M	7.7	9.9	5.0	9.4
B 3710-1	M	8.0	8.8	6.5	8.5
Red LaSoda	M	8.0	8.9	6.4	8.8
Sheridan	M	8.3	7.9	5.8	7.9
B 3319-30	M	8.4	10.0	6.9	9.9
B 2874-4	M	8.7	9.4	6.9	8.9
B 3604-1	M	8.7	9.8	6.7	9.3
B 3692-4	M	8.9	9.8	7.0	9.2
B 3427-7	M	9.1	9.2	7.8	9.0
La 3769	M	9.9	8.9	8.9	8.9
B 3819-17	M	10.0	9.8	10.0	9.9
Kennebec	L	5.8	6.2	4.3	9.2
B 579-3	L	7.0	7.8	5.5	7.7
Katahdin	L	7.8	8.5	6.5	7.8
B 3913-7	L	8.4	9.8	7.3	9.2
B 3424-11	L	8.5	9.4	7.4	9.1
B 137-5	L	8.8	10.0	7.5	10.0
La 1859	L	8.9	9.3	8.1	8.4
B 2368-13	L	9.3	7.9	7.8	6.7
B 3453-2	L	9.3	8.8	8.8	8.4
B 3410-36	L	9.4	10.0	9.1	10.0

1/ See the 1957 National Potato Breeding Program report for yield and total solids data of the selections in this table.

2/ Color indices based on the standard color chart of the National Potato Chip Institute. The figure 1 represents a very light color and the figure 10 a very dark color.

Potato chips were made from the Kennebec sample at weekly intervals until the variety produced chips of an acceptable color. At that time (approximately 35 days) potato chips and french fries were made from the conditioned yield trial samples, and from the samples stored continuously at 38° F. Potato slices 1/16 inch thick were used for potato chips. They were sliced, rinsed in cold water, dried and then fried in vegetable shortening at 350° F. until the oil ceased bubbling. Blocks of potato tissue 1/2 by 1/2 inch by approximately 1½ inches long were used for French fries. The French fries were cooked in vegetable shortening for 3 and 1/2 minutes at a temperature of 375° F. A total of 10 chips and 10 French fries, two from each tuber, were made from each 5 tuber sample. Each of the 10 chips or French fries was compared with the standard color reference chart of the National Potato Chip Institute and the corresponding class number recorded. The 10 numbers were totaled and divided by 10 to obtain the sample index. The figure 1 represents a very light-colored chip or French fry and the figure 10 a very dark-colored sample.

A sample index of 7 or below is considered acceptable in color. The indices listed in P. I. table 10 are the means of four replicates. None of the varieties produced potato chips or French fries of an acceptable color when processed directly from 38° F. storage. Three of the selections, La 3769, B 3819-17, and B 2368-13 produced lighter-colored chips and French fries after 38° F. storage and conditioning than before cold storage. Normally the reverse effect is obtained with the majority of potato varieties. Without exceptions, all values of the French fry color index were lighter than, or identical to, the corresponding chip index. This relationship was maintained for post-harvest processing and processing after conditioning following storage.

Dates of Seed Cutting and Dehydration for Four Varieties

Tests on the effects of dates of seed cutting and seed dehydration similar to those conducted in 1957, were continued in 1958. The advantages of cutting seed early, and dehydration of the cut seed were discussed in the 1956 report.

Beginning on February 1 and at monthly intervals thereafter, 2-bushel samples of the varieties, Kennebec, Katahdin, Sebago, and Irish Cobbler, were cut into 2-ounce seedpieces. The samples were moved to a 50-60° F. room 2 days before cutting. After cutting, the seedpieces were placed in burlap sacks and dipped in a solution containing .4 ounce per gallon of 50 percent wettable Captan. The treated seed was drained and then stored at 60° F. for 3 days to promote suberization. The suberized seedpieces were then placed in a dryer, maintained at 90° F., until the specified amount of moisture was removed (P. I. table 11). After drying, the seed was returned to common storage.

The data for the effect of drhydration on yield are given in P. I. table 11. Germination and yield were adversely affected by removing the water from the seedpieces. Kennebec apparently was the least affected by the dehydration treatment since it was the highest yielding variety in the test and also had the highest average germination. Sebago was the lowest yielding variety and also had the lowest percent of germination. Percent germination ranged from a high of 95 percent for Kennebec to a low of 49 percent for Sebago.

In previous years considerable mold growth was observed on the dehydrated seed at planting time. Seed treatment before dehydration was introduced in an attempt to reduce mold growth to a minimum. However, despite treatment severe mold growth again developed on the seed at planting time this year. It is highly probably that some of the low germination, and consequent reductions in yield shown in P. I. table 11 were due to mold growth on the seed. At planting time, there appeared to be a uniform amount of mold growth among the four dehydration treatments.

The effect of cutting dates on yield is tabulated in P. I. table 12. Significant differences were found between variety yields, and between seed cutting dates. There were no significant differences in yield between cutting dates for the variety Katahdin. The low germination of Irish Cobbler seed cut in March is probably due to mold growth on the cut seed.

P. I. table 11. Effect of dehydration of seed on yield1/ of U.S. No. 1 tubers per acre of 4 varieties planted at Presque Isle, Maine, 1958.

	Percent moisture removed from seed									
	0		10		20		30		Means	
Variety	U.S. No.1	Germination	U.S. No.1	Germination	U.S. No.1	Germination	U.S. No.1	Germination	U.S. No.1	Germination
	cwt.	Pct.	cwt.	Pct.	cwt.	Pct.	cwt.	Pct.	cwt.	Pct.
Kennebec	394	95	377	89	372	88	305	62	362	84
Katahdin	358	92	354	92	340	83	294	64	336	83
Irish Cobbler	288	86	284	82	247	74	251	72	267	78
Sebago	290	86	297	81	264	66	234	49	271	71
Means	332	90	328	86	306	78	271	62		

1/ Difference between 2 variety means at .05 level 21 cwt.
Difference between means of same variety for any 2 dehydrations 21 cwt.
Difference between 2 dehydration means at .05 level 10 cwt.

P. I. table 12. Effect of dates of seed cutting on yield of U.S. No. 1 tubers per acre of 4 varieties planted at Presque Isle, Maine, 1958.

	Seed cutting dates									
	February		March		April		May		Means	
Variety	U.S. No. 1	Germi- nation	U.S. No. 1	Germi- nation	U.S. No. 1	Germi- nation	U.S. No. 1	Germi- nation	U.S. No. 1	Germi- nation
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Kennebec	333	80	354	83	378	86	382	88	362	84
Katahdin	319	80	348	83	333	82	345	87	336	83
Irish Cobbler	285	89	201	43	276	91	307	91	267	78
Sebago	232	52	285	70	279	77	288	83	271	71
Means	292	75	297	70	317	84	331	87		

1/ Difference between 2 variety means at .05 level 21 cwt.
Difference between means of same variety for any 2 dates 30 cwt.
Difference between 2 cutting dates at .05 level 15 cwt.

Scab Resistance

A total of 1037 seedling selections representing 101 family lines were tested for scab resistance in scab-infested soil on Aroostook Farm. In addition, this year 88 varieties from the American variety collection were retested for scab resistance. The results from these tests are tabulated in P. I. table 13. Most of the selections compared were obtained from seedling hills selected at Chapman Farm in 1957. Of the 88 American varieties tested for scab resistance, 33 had type 1 or type 2 scab pustules. A detailed report on the disease resistance of these American varieties will be given when the screening tests are completed. The scab surface area most commonly occuring was 1 to 20 percent (class 1); and the most commonly occuring pustule type was large rough pustules (type 3). The Green Mountain check had from 21 to 60 percent of the tuber surface covered with large rough pustules.

P. I. table 13. Summary of the data from the scab tests on Aroostook Farm, Presque Isle, Maine, 1958.

Material tested	Total number	Surface area covered 1/ T	1	2	3	4	Type pustule 2/ 1	2	3	4
Seedling varieties	1037	325	497	163	51	1	410	235	323	67
Gr. Mountain check	1037			645	441				1037	

1/ Surface area covered: T, less than 1 percent; 1, 1 to 20 percent; 2, 21 to 40 percent; 3, 41 to 60 percent; and 4, 61 to 80 percent.

2/ Type of pustule: 1, small, superficial; 2, large, but still superficial; 3, large, rough pustules; and 4, large rough pustules, deeply pitted.

Each year a number of new selections and varieties are tested for scab resistance in comparison with the susceptible check variety Green Mountain. The results of this scab nursery test for 1958 are summarized in P. I. table 14. Six of the 27 selections tested exhibited large rough pustules that were deeply pitted (type 4) in one or the other of the two replicates. Twelve other selections were highly resistant to scab. Less than 1 percent of the tuber surfaces of these selections was covered with small superficial pustules. Eighteen of the remaining selections had type 1 or type 2 scab pustules and may be considered to have some scab resistance.

P. I. table 14. Scab nursery test planted in infested soil on Aroostook Farm, Presque Isle, Maine, 1958.

Seedling or variety	Replicate 1 Seedling Ar.	Ty.	Check 1/ Ar.	Ty.	Replicate 2 Seedling Ar.	Ty.	Check Ar.	Ty.
B 3114-67	3	1	2	3	1	2	2	3
B 3457-2	1	1	2	3	1	1	2	3
B 4075-1	1	2	2	3	1	3	2	3
B 4087-5		X 2/	2	3		X	2	3
B 4090-1	T	1	2	3	T	1	2	3
B 4090-5	T	1	2	3	1	2	2	3
B 4093-2	1	3	2	3	T	1	2	3
B 4093-7	1	1	2	3	1	1	2	3
B 4093-14	T	1	2	3	T	1	2	3
B 4093-15	1	4	2	3	1	2	2	3
B 4094-9	T	1	2	3	T	1	2	3
B 4105-2	T	1	2	3	1	3	2	3
B 4116-5	1	2	2	3	1	4	2	3
B 4119-1	2	4	2	3	1	3	2	3
B 4120-2	1	4	2	3	T	1	2	3
B 4128-14	T	1	2	3	T	1	2	3

P. I. table 14. (Continued)

B 4130-7	1	1	2	3	T	1	2	3
B 4130-11	T	1	2	3	T	1	2	3
B 4132-14	1	1	2	3	1	2	2	3
B 4132-23	1	1	2	3	2	3	2	3
B 4132-25	1	1	2	3	T	1	2	3
B 4134-24	1	4	2	3	1	3	2	3
B 4134-34	1	4	2	3	1	4	2	3
B 4135-2	1	2	2	3	no	test	2	3
B 4158-5	T	1	2	3	T	1	2	3
B 4170-3	1	1	2	3	1	2	2	3
B 4207-1	1	1	2	3	1	2	2	3

1/ See footnote table 13 for class ratings.
2/ X indicates only the "so called" russet scab was present.

Verticillium Wilt Resistance

A. E. Schark, R. V. Akeley, and R. Bonde

Approximately 491 selections from 55 family lines were tested for wilt resistance in wilt-infested soil at Caribou, Maine, in 1958. The results are tabulated in P. I. table 15. The check varieties Cherokee, Katahdin, and Houma were planted at intervals of 25 rows throughout the plot. Cherokee is susceptible to wilt, and Houma and Katahdin are moderately resistant. The level of infection as measured by the check varieties was about as great as in previous years. For the past 4 years Cherokee has been 100 percent infected with verticillium wilt. However, Houma and Katahdin have varied in wilt susceptibility from year to year. In 1957, 56 percent of the Katahdin selections and 89 percent of the Houma selections were wilt infected. In 1958, the susceptibility was reversed; sixty-seven percent of the Katahdin selections and 60 percent of the Houma selections were infected with verticillium wilt. The number of family lines with complete resistance or complete susceptibility was small this year. Only 3 family lines were 100 percent free of wilt symptoms. However, 38 (69 percent) of the 55 family lines had one or more hills resistant to the disease.

P. I. table 15. Verticillium-wilt-resistance test, 5-hill plots, on the Ashby Farm, Caribou, Maine, 1958.

Material tested	Selections tested	Selections infected		Readings based on total hills: Total	Infected	
	No.	No.	Pct.	No.	No.	Pct.
Fifty-five family lines	491	371	76	2445	1155	47
Cherokee check	15	15	100	75	48	64
Katahdin check	15	10	67	75	23	31
Houma check	15	9	60	75	18	24

Variety Test in Wilt-Infected Soil

A. E. Schark, R. V. Akeley and R. Bonde

Twelve seedling selections or named varieties were tested for wilt resistance on infested soil at Caribou, Maine, in 1958. The data from this yield test are summarized in P. I. table 16. Ontario ranked first in yield and also had the lowest percent of wilt-infected hills. Only three varieties ranked lower than Ontario in solids content. The most susceptible variety was Irish Cobbler with 83 percent of the hills infected with wilt. The solids content of Irish Cobbler was higher than the percent solids for Ontario. There were no significant differences in yield between the five highest yielding varieties. In 1957, 50B9-8 was the highest yielding variety in the trial. It was also one of the most wilt-susceptible varieties. This year, 50B9-8 ranked fifth in yield and was one of the most wilt-resistant selections. Only 3 selections, 792-94, 41956, and Ontario had lower percentages of wilt-infected hills than 50B9-8. The relatively low yield of 50B9-8 this year was probably caused by poor seed germination due to wet weather conditions after planting. The average germination of this variety was 73 percent. In past years the seedling variety X792-88 has been one of the most wilt-resistant selections tested. In 1954, 1955, and 1956, X792-88 had less than 10 percent of wilt-infected hills, and was one of the three most wilt-resistant seedlings those years. In 1957, this selection ranked eleventh in wilt resistance with 30 percent wilt-infected hills. This year, X792-88 ranked fourth in wilt resistance with 11 percent wilt-infected hills.

As in previous years, a co-variance analysis was made between disease incidence and yield. The correlation coefficients in both cases were non-significant.

P. I. table 16. Reaction to verticillium wilt as reflected in yields and percent solids of 12 varieties of potato grown in wilt-infected soil at Caribou, Maine, 1958.

Variety	Hills infected with wilt	Yield per acre U. S. No. 1			Solids
	Pct.	Cwt.	Bu.	Pct.	Pct.
Ontario	6	366	610	98	17.0
Houma	16	363	605	97	18.2
B 2368-4	41	358	596	98	16.8
Katahdin	18	349	582	98	17.6
50B9-8	8	349	582	98	15.0
792-94	2	308	514	92	19.6
Menominee	51	306	510	97	17.9
41956	2	305	509	90	19.4
Tawa	66	304	507	96	16.3
Irish Cobbler	83	297	495	94	17.6
792-88	11	291	485	88	19.1
B 73-3	30	249	413	96	17.4
L.S.D. .05		50	84		0.9

Covariance Dis. angle & D.M. = -.243 N.S.
Covariance Dis. angle & yield U.S. No. 1 = -.17 N.S.

Varietal Reaction to Net Necrosis and Stem-End Browning

Four named varieties and 5 seedling selections were tested for resistance to net necrosis as measured by yield and percent of infected tubers. Leaf roll infected tubers, planted in alternate rows of the test, were used to provide one source of infection. On July 17 and again on July 25, aphids that had fed on leaf roll infected Katahdin plants were placed on all plants in the test. The spread of leaf roll in the field this year, as measured by tuber infection, was very satisfactory. Mohawk, the susceptible check, had about 68 percent of its tubers infected with the virus. The tubers were stored at 50° F. between harvest (September 20, 1958) and the time the material was cut and examined (January 6, 1959). Stem-end browning symptoms were also recorded. Six selections were found free of net necrosis symptoms, but only 4 of the 6 were also free of both net necrosis and stem-end browning symptoms. The variety most susceptible to net necrosis, excluding the check variety Mohawk, was Delus. Net necrosis symptoms developed in about 43 percent of the Delus tubers. Delus was also the variety most susceptible to stem-end browning. The low yield of 50B9-8 was due to poor seedpiece germination. Germination of this variety was less than 50 percent.

P. I. table 17. Yields and tuber symptoms for net necrosis and stem-end browning of 9 potato varieties exposed to leaf roll in the field, Aroostook Farm, Presque Isle, Maine, 1958.

Variety	U. S. No. 1 yield per acre			Total tubers examined	Net necrosis	Stem-end browning
	Cwt.	Bu.	Pct.	No.	Pct.	Pct.
B 2368-4	444	740	98	367	0.0	0.0
B 927-3	381	634	91	533	0.0	0.4
Plymouth	368	613	97	366	3.8	13.4
B 2187-25	348	580	96	426	0.0	0.0
X 1276-185	338	563	94	403	0.0	1.5
Delus	307	511	97	330	43.6	17.3
Boone	298	497	91	406	0.0	0.0
Mohawk	297	495	93	306	68.3	0.0
50B9-8	258	431	95	256	0.0	0.0
L.S.D. .05	56	92				

Late Blight Injury as Reflected in Yield and Percentage of Solids

Six varieties were exposed to a late blight epiphytotic on the Aroostook Farm in 1958. Three highly-resistant varieties, Kennebec, Merrimack, and Saco; and two moderately-resistant varieties, Sebago and Menominee, were compared with the susceptible variety Katahdin. The field plot was sprayed at 7 day intervals with the treatments given in P.I. table 18. Each treatment was isolated from the adjacent plot by 2 rows of the susceptible variety Teton. On July 15, the Teton guard rows were inoculated with late blight using a single late blight infected Green Mountain plant per row. By August 19, the Teton vines were completely dead from late blight injury. A combination of the fungicide, (Dithane) and the insecticide (DDT) had a greater effect on yield than either one alone.

F. I. table 18. Reaction of 6 varieties to late blight as reflected in yields and percentage solids.[1]
Aroostook Farm, Presque Isle, Maine, 1958.

	Treatments, yield,[2] and percentage solids[3]													
	Water			DDT			Dithane			DDT + Dithane			Means	
Variety	U. S. No. 1		Solids	U. S. No. 1		Solids	U. S. No. 1		Solids	U. S. No. 1		Solids	U.S. No. 1	Solids
	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.
Katahdin	39	51	15.3	25	43	15.1	210	92	18.8	227	94	18.9	203	17.0
Sebago	108	77	15.7	81	69	15.6	271	94	20.5	301	94	19.3	309	17.8
Menominee	110	78	16.4	93	72	15.8	319	95	20.0	308	97	19.6	338	18.0
Merrimack	186	91	19.7	182	89	19.8	272	96	22.0	266	94	20.7	368	20.5
Saco	212	91	18.8	233	92	18.9	344	96	21.7	402	97	22.1	484	20.4
Kennebec	222	94	18.9	234	94	18.6	371	97	21.3	393	96	21.5	496	20.1
Means	238		17.4	230		17.3	484		20.7	514		20.4		

1/ Based on specific gravity of tubers.
2/ Difference between 2 variety means at .05 level 24 cwt.
Difference between means of same variety for any 2 treatments, 42 cwt.
3/ Difference between 2 variety means at .05 level, 0.5 percent.
Difference between means of same variety for any 2 treatments, 1.0 percent.

DDT alone when compared with the water-treatment control increased yields in only 2 varieties, Saco and Kennebec. Significant differences in yields were observed between the water or DDT treatment when compared with the Dithane treatment. The yield of the highly susceptible variety Katahdin increased from 39 hundred-weight per acre when water was used as a spray, to 227 hundred weight per acre when a spray consisting of Dithane plus DDT was used. The percentage of solids in the varieties followed the same pattern as the yield data. The more resistant varieties, Merrimack, Saco, and Kennebec also had the highest percentages of solids.

Late Blight Resistance

R. W. Buck, Jr., and Muriel J. O'Brien

During 1958, 6,548 seedlings from 26 crosses and 3 selfed lines were inoculated with zoospores from race 0 of Phytophthora infestans. One or both of the parents were immune from one or more of the races of P. infestans. The data from this test are summarized in P. I. table 19. Of the 6,548 seedlings 5,481 or 83.7 percent survived.

P. I. table 19. Summary of data obtained from late blight inoculation of seedlings, 1958.

	Seedlings inoculated	Seedlings infected		Seedlings surviving	
		No.	Pct.	No.	Pct.
26 crosses	6,004	1,019	17.0	4,985	83.0
3 selfed lines	544	48	8.8	496	91.2
	6,548	1,067	16.3	5,481	83.7

Golden Nematode Resistance

R. V. Akeley, L. C. Peterson, and A. E. Schark

The results of the 1958 test for golden nematode resistance are given in P. I. table 20. The procedure for evaluating the resistance to nematodes was the same as that used in previous years. By backcrossing resistant selections to S. tuberosum parents having multiple-disease resistance and desirable horticultural characters, it should be possible in a reasonable time to produce a commercial variety possessing good multiple disease resistance and other acceptable characters.

P. I. table 20. Golden-nematode-resistance tests. Selections made in Maine, 1956, and tested on Long Island in 1957.1/

Pedigree number	Parentage	Increase, Me. 1957 grown	Increase, Me. 1957 selected	N. Y. tested, 1958 susceptible	N. Y. tested, 1958 resistant
		No.	No.	No.	No.
B 4235	Delus x B 4005-10	297	7	6	1
B 4270	B 355-24 x B 4005-10	276	6	3	3
B 4287	B 725-61 x B 4005-10	249	14	11	3
B 4296	B 929-32 x B 4005-10	400	23	12	11
B 4307	B 3139-24 x B 4005-10	320	10	7	3
B 4323	B 3707-4 x B 4005-10	314	5	3	2
B 4326	B 4002-1 x B 2067-52	105	1	0	1
B 4327	B 4002-1 x Earlaine	175	6	6	0
B 4328	B 4005-102 x Katahdin	178	3	3	0
	Totals		75	51	24

1/ Tests were made by L. C. Peterson and co-workers on Long Island, N. Y.

Effects of Seed Spacing and Fertilizer Rate on Field Performances of Potato Varieties

G. V. C. Houghland and R. V. Akeley

A factorial experiment comparing the field performances of the varieties Saco, Kennebec, Katahdin, and Merrimack was repeated in 1958 at Aroostook Farm, Presque Isle, Maine. These varieties were planted at 3 different spacing distances with 5 rates of fertilizer application. The treatment effects on yield, tuber size, and number of tubers per hill were determined.

The following tabulations show the results obtained from main effects:

Main Effects. Average yields - 2-inch minimum grade.

Fertilizer Rates	800 lb.	1000 lb.	1200 lb.	1400 lb.	1600 lb.
Yield (cwt/a.)	329.5	337.4	354.6	346.2	358.7

L.S.D., .05 level = 20.5 cwt., .01 level = 28.7 cwt.

Varieties	Saco	Kennebec	Katahdin	Merrimack
Yield (cwt/a.)	408.5	375.6	359.5	237.6

L.S.D., .05 level = 11.5 cwt., .01 level = 15.4 cwt.

Seed Spacings	6-inch	9-inch	12-inch
Yield (cwt/a.)	365.2	341.9	328.7

L.S.D., .05 level = 9.5 cwt., .01 level = 12.6 cwt.

Main Effects. Number of tubers per hill -- 2-inch minimum grade.

Fertilizer Rates	800 lb.	1000 lb.	1200 lb.	1400 lb.	1600 lb.
Number per hill	3.93	3.93	4.01	3.87	3.89

Variance not significant

Varieties	Saco	Kennebec	Katahdin	Merrimack
Number per hill	4.31	3.61	4.06	3.72

L.S.D. .05 level = 0.20, .01 level = 0.27

Seed Spacings	6-inch	9-inch	12-inch
Number per hill	3.4	3.93	4.70

L.S.D. .05 level = 0.13, .01 level = 0.17

Main Effects. Average weight (oz.) of tuber -- 2-inch minimum grade.

Fertilizer Rates	800 lb.	1000 lb.	1200 lb.	1400 lb.	1600 lb.
Weight (oz.)	6.40	5.64	6.77	6.86	7.02

L.S.D. .05 level = 0.26 oz., .01 level = 0.37 oz.

Varieties	Saco	Kennebec	Katahdin	Merrimack
Weight (oz.)	7.32	7.92	6.73	4.90

L.S.D. .05 level = 0.21 oz., .01 level = 0.28 level

Seed Spacings	6-inch	9-inch	12-inch
Weight (oz.)	6.05	6.84	7.28

L.S.D. .05 level = 0.16 oz., .01 level = 0.21 oz.

Some of the highlights of these results indicate that the effect of fertilizer on yield was not pronounced and the effect of fertilizer on number of tubers per hill was not significant. The average weight of tuber was the only factor appreciably affected by increasing the fertilizer rate.

Of the 4 varieties, Saco and Kennebec produced higher yields and larger tubers than Katahdin and Merrimack.

In general, narrowing the seed spacing from 12 to 6 inches reduced the number and the size of the tubers while the yield, on the other hand, was increased due to the greater number of plants at the narrower spacing. This effect, however, was not uniform for the varieties studied since the interaction Seed Spacing x Variety was significant for yield, average tuber weight, and number of tubers per hill.

The following P. I. table 21 shows how the 4 varieties were affected by seed spacing as regards yield, weight of tuber, and number of tubers per hill. Saco and Kennebec were the higher yielding varieties at the 6-inch spacing while Merrimack was the lowest in yield at every seed spacing. This confirms the results of previous experiments indicating that Saco and Kennebec are more responsive to intensive cultural methods than is Merrimack. Despite the reductions in average weight of tuber caused by narrower seed spacing, the tubers of Saco and Kennebec were still significantly larger than those of Katahdin and Merrimack at every seed spacing.

Saco also produced the greatest reduction in number of tubers per hill as seed spacing was narrowed.

These results indicate that Saco and Kennebec seedpieces can be spaced closer to decrease the number of oversized tubers while total yields can be increased.

P. I. table 21. Effects of seed spacing and fertilizer rate on potato varieties, Presque Isle, Maine, 1958.

Factor indicated and variety	Interaction: Seed Spacing x Variety — Seed Spacings 6-inch	9-inch	12-inch
	Cwt.	Cwt.	Cwt.
Yield			
Saco	538.5	501.2	491.9
Kennebec	504.1	475.2	428.9
Katahdin	480.1	433.1	434.6
Merrimack	303.3	300.0	288.1
Spacing - L.S.D. .05 level 19.1 cwt., .01 level 25.1 cwt.			
Variety - L.S.D. .05 level 23.0 cwt., .01 level 30.7 cwt.			
Weight per tuber	ounces	ounces	ounces
Saco	8.27	9.56	9.61
Kennebec	9.03	10.10	10.56
Katahdin	7.44	8.47	9.32
Merrimack	5.47	6.07	6.89
Spacing - L.S.D. .05 level 0.32 oz., .01 level 0.42 oz.			
Variety - L.S.D. .05 level 0.42 oz., .01 level 0.56 oz.			
Tubers per hill	number	number	number
Saco	3.96	5.20	6.69
Kennebec	3.63	4.60	5.29
Katahdin	4.18	4.99	6.03
Merrimack	3.60	4.85	5.49
Spacing - L.S.D. .05 level 0.25, .01 level 0.33			
Variety - L.S.D. .05 level 0.40, .01 level 0.54			

Solanum Species and Hybrids

R. W. Buck, Jr.

Investigations on crossability among diploid species were continued in 1958. A total of 586 interspecific combinations were attempted among diploid species and clones. Seed was obtained from 246 combinations.

Several clones of 67 interspecific diploid hybrids were studied cytologically. All showed normal chromosome pairing at diakinesis and metaphase I with usually 12 bivalents in each cell. Occasional hybrids were observed with bridges and fragments at anaphase I.

Attempts were made to self and to cross with S. tuberosum several artificial tetraploids of diploid species and hybrids. On selfing, 23 of 39 clones set seed. In crosses with Katahdin, 18 of 34 clones set seed, and with Menominee, 26 of 44 set seed.

Instances of male sterility have been observed in diploid hybrids involving certain clones of S. verrucosum as the female parent. This appears to be cytoplasmically controlled.

Potato Disease Investigations

R. E. Webb, E. S. Schultz, M. J. O'Brien, R. V. Akeley,
R. W. Buck, Jr., and Allen Schark

Eleven hundred and thirty-one selections were screened for resistance to late blight in the greenhouse and under field conditions. Sixty-six named varieties were included in the latter test. Race "O" was used to inoculate the selections in the greenhouse and the susceptible Green Mountain inter-planted in the field plot. Tables 1, 2, 3, and 4 summarize the results. Six hundred and sixty-one selections were highly resistant to race "O" in the greenhouse (Webb table 1). Of the 435 selections showing susceptibility to race "O" in the field, 11 were highly field resistant, 87 were moderately resistant, and 238 were slightly resistant in the field (Webb table 2). Six hundred and twenty-four selections that were immune in the greenhouse were included in the field test. The early appearance of 14 Physiologic races of late blight afforded an opportunity to note the field resistance of most of these selections under conditions favorable for infection and spread of the organism. Forty-three selections failed to become infected, 10 were highly resistant, 55 were moderately resistant and 173 were slightly resistant under conditions of the test (Webb table 3). Table 4 summarizes the relative resistance of 66 varieties to late blight under field conditions in 1958.

Webb table 1. Reaction of selected potato seedlings to late blight in the greenhouse. 1958. Aroostook Farm, Presque Isle, Maine.

Pedigree	Parentage	Number Seedlings	Reaction to "O" race[1/] Number Immune	Susceptible
B 4229	Cayuga x Cherokee	15	7	8
B 4231	" x B 3319-30	5		5
B 4235	Delus x B 4005-10	7	4	3
B 4233	Delus x Cherokee	8	6	2
B 4238	Houma x B 3299-13	11		11
B 4241	Kennebec x "	13	5	8
B 4242	Menominee x B 3319-30	12		12
B 4244	Merrimack x B 3139-24	9	4	5
B 4245	" x Ac 26032	18	13	5
B 4241	Kennebec x B 3299-13	1	1	
B 4246	Mohawk x Merrimack	1		1
B 4249	" x Ac 26032	2	1	1

Webb table 1. (Continued)

B 4250	ND457-1 x B 3139-24	12	3	9
B 4252	" x Ac 26031	1	1	
B 4254	Record x B 3556-12	1		1
B 4255	Sebago x Cherokee	6	2	4
B 4259	Sequoia x Cayuga	10		10
B 4262	B 24-58 x B 4005-10	1		1
B 4265	B 24-78 x B 3646-11	7	5	2
B 4267	B 96-56 x Ac 26031	22	17	5
B 4269	B 355-24 x B 3139-24	48	23	25
B 4270	" x B 4005-10	6	2	4
B 4271	" x Ac 26031	2	2	
B 4272	B 595-76 x Cherokee	11	7	4
B 4273	" x ND 457-1	24	13	11
B 4274	" x B 2067-52	10	5	5
B 4275	" x B 3139-24	17	8	9
B 4279	B 606-37 x ND 457-1	36	12	24
B 4280	" x B 3139-24	4	2	2
B 4281	" x B 3309-8	12	12	
B 4283	627-167 x B 3139-24	16	8	8
B 4285	B 725-6 x Merrimack	20	13	7
B 4286	" x B 3139-24	49	15	34
B 4287	" x B 4005-10	14		14
B 4288	792-88 x Ac 26032	12	6	6
B 4289	B 902-2 x Merrimack	11	4	7
B 4290	" x B 3139-24	26	9	16
B 4291	B 922-3 x B 3556-12	27	19	8
B 4294	B 929-32 x B 3139-24	33	22	11
B 4296	" x B 4005-10	23	17	6
B 4298	B 991-14 x B 3139-24	13	6	7
B 4299	" x B 3556-12	29	28	1
B 4300	B 2067-52 x B 3209-35	10		10
B 4302	B 2922-26 x B 3672-3	27	25	2
B 4303	B 3097-82 x Menominee	13	11	2
B 4304	" x ND 457-1	33	28	5
B 4305	" x B 3299-13	21	18	3
B 4306	B 3139-24 x B 3556-12	2	2	
B 4307	" x B 4005-10	10	5	5
B 4309	B 3209-35 x B 2067-52	5		5
B 4312	B 3309-8 x B 3139-24	22	18	4
B 4313	KB 3347-39 x Menominee	4		4
B 4314	B 3403-10 x B 3139-24	13	12	1
B 4315	B 3428-4 x B 3556-12	10	10	
B 4316	B 3454-5 x B 3139-24	24	9	15
B 4317	B 3556-12 x B 3209-35	15	4	11
B 4318	B 3641-1 x B 2067-52	18		18
B 4321	B 3707-4 x B 3139-24	25	18	7
B 4323	" x B 4005-10	5	4	1
B 4326	B 4002-1 x B 2067-52	1		1
B 4327	" x Earlaine	6		6

Webb table 1. (Continued)

B 4328	B 4005-102 x Katahdin	3		3
B 4329	47156 x B 3556-12	14	10	4
B 4330	Ac 26033 x Cherokee	5	5	
B 4331	Hindenburg x Menominee	3		3
B 4332	" x B 929-6	2		2
B 4336	Houma x B 606-3	15	5	10
B 4338	A 129-11 x B 3410-22	7	5	2
B 4342	B 2903-17 x B 1377-78	7		7
B 4344	Houma x Ac 25953	4	4	
B 4345	HSO-2 x Earlaine	2	2	
B 4346	" x Ac 25976	3	3	
B 4347	Menominee x Ac 25953	13	13	
B 4348	Mohawk x "	7	7	
B 4352	Sebago x "	4	4	
B 4354	TI-5 x "	7	6	1
B 4355	" x Ac 26031	6	6	
B 4357	96056 x Ac 25953	3	3	
B 4359	B 595-76 x "	5	5	
B 4360	" x Ac 26031	3	3	
B 4362	B 922-3 x 96-56	8	8	
B 4363	B 922-6 x Ac 26031	5	5	
B 4365	B 3641-18 x Ac 25953	3	3	
B 4367	B 3707-4 x Ac 26031	2	2	
B 4368	B 3720-9 x Ac 25953	2	2	
B 4369	47156 x "	7	7	
B 4370	Ac 25953 x TI-5	2	2	
B 4371	Ac 25976 x HSO-2	13	13	
B 4372	Ac 25977 x "	33	32	
B 4373	" x Katahdin	10	10	
B 4376	B 595-76 x Menominee	3	3	
B 1514	B 725-61 selfed	1		1
B 1516	B 2067-52 "	1		1
B 1518	B 3014-10 "	1	1	
B 1525	B 4002-1 "	1		1
B 1526	B 4005-10 "	1		1
I 5505	I 801-10 x I 1077-14	8	5	3
I 5572	I 1106-5 x I 1077-W 28-5	1		1
I 55143	B 595-76 x Osage	2	1	1
I 55150	" x I 1077-W 28-5	2	2	
I 55190	B 2368-4 x B 3131-8	1		1
La. 5347		1	1	
La. 6279		1	1	
B 4002-1		1		1
B 4002-10		1		1
B 4005-10		1		1
B 2067-52		1		1
ND 457-1		1		1
Ac 25976		1	1	
Ac 25977		1	1	
X 627-164		1		1
B 3299-13		1		1
Ac 25953		1	1	

Webb table 1. (Continued)

B 3097-82	1	1	
B 3209-35	1		1
TI-5	1	1	
51.1-53-13	1		1
51.4-53-1	1		1
51.4-53-5	1		1
50.4-52-40	1		1
Ac 26031	1	1	
Ac 26033	1	1	
Ac 26037	1	1	
Ac 26040	1		1
OB 3031-1	1		1
B 355-24	1		1
B 2340-2	1		1
B 2896-10	1		1
B 2968-7	1		1
" -50	1		1
B 922-3	1	1	
B 929-23	1	1	
B 3646-11	1	1	
B 2187-25	1		1
96-56	1	1	
B 73-3	1	1	
B 595-76	1	1	
B 2368-4	1		1
B 355-35	1	1	
B 2922-26	1	1	
B 3319-30	1		1
B 3454-5	1		1
B 3556-11	1		1

1/ Inoculum was obtained from infected leaves of Green Mountain, Conidia were germinated and the zoospore suspension were atomized onto the plants in the moist chamber when they were 6-8" high. Readings made 14 days after inoculations.

Webb table 2. Field resistance to late blight of selected potato seedlings susceptible to the "O" race. 1958. Aroostook Farm, Presque Isle, Maine.

Pedigree	Parentage	Number Seedlings	Relative resistance 14 days after infection 1/					
			1	2	3	4	5	6
B 4229	Cayuga x Cherokee	8			4	3	1	
B 4231	" x B 3319-30	5				5		
B 4233	Delus x Cherokee	3		2		1		
B 4235	Delus x B 4005-10	3				3		
B 4238	Houma x B 3299-13	11					7	4
B 4241	Kennebec x "	8		1		6	1	
B 4242	Menominee x B 3319-30	12				9	3	
B 4244	Merrimack x B 3139-24	5			2	3		
B 4245	" x Ac 26032	4			3	1		
B 4246	Mohawk x Merrimack	1				1		
B 4249	" x Ac 26032	1				1		
B 4250	ND 457-1 x B 3139-24	9			2	6	1	
B 4254	Record x B 3556-12	1				1		
B 4255	Sebago x Cherokee	4			2	2		
B 4259	Sequoia x Cayuga	10			3	4	3	
B 4262	B 24-58 x B 4005-10	1			1			
B 4265	B 24-78 x B 3646-11	2				2		
B 4267	96-56 x Ac 26031	5			4	1		
B 4269	B 355-24 x B 3139-24	24			3	12	5	
B 4270	" x B 4005-10	4			1	3		
B 4272	B 595-76 x Cherokee	4		1		3		
B 4273	" x ND 457-1	11		1		10		
B 4274	" x B 2067-52	5			1	4		
B 4275	" x B 3139-24	9			1	4	3	1
B 4279	B 606-37 x ND 457-1	24			6	18		
B 4280	" x B 3139-24	1				1		
B 4283	627-164 x B 3139-24	7				3	4	
B 4285	B 725-6 x Merrimack	7			2	4	1	
B 4286	" x B 3139-24	34			2	16	15	1
B 4287	" x B 4005-10	14			3	7	4	
B 4288	792-88 x Ac 26032	6			2	3	1	
B 4289	B 902-2 x Merrimack	7			4	3		
B 4290	" x B 3139-24	17			4	7	5	1
B 4291	B 922-3 x B 3556-12	7		1	1	4	1	
B 4294	B 929-32 x B 3139-24	8			1	5	1	1
B 4296	" x B 4005-10	6			5	1		
B 4298	B 991-14 x B 3139-24	7			2	5		
B 4299	" x B 3556-12	1			1			
B 4300	B 2067-52 x B 3209-35	10			3	6	1	
B 4302	B 2922-26 x B 3672-3	2		1		1		
B 4304	B 3097-82 x Menominee	2				2		
B 4304	" x ND 457-1	4			1	3		
B 4305	" x B 3299-13	3				2	1	
B 4307	" x B 4005-10	5				5		
B 4309	B 3209-35 x B 2067-52	5				4	1	
B 4312	B 3209-8 x B 3139-24	4		2		2		

Webb table 2. (Continued)

			1	2	3	4	5	6
B 4313	KB 3347-39 x Menominee	4				1	3	
B 4314	B 3403-10 x B 3139-24	1			1			
B 4316	B 3454-5 x B 3139-24	15			4	8	3	
B 4317	B 3556-12 x B 3209-35	11			1	6	3	1
B 4318	B 3641-18 x B 2067-52	18			1	8	9	
B 4321	B 3707-4 x B 3139-24	7			1	4	2	
B 4323	B 3707-4 x B 4005-10	1				1		
B 4326	B 4002-1 x B 2067-52	1				1		
B 4327	" x Earlaine	6			1	5		
B 4328	B 4005-102 x Katahdin	3				1	2	
B 4329	47156 x B 3556-12	3			2	1		
B 4331	Hindenburg x Menominee	3			2	1		
B 4332	" x B 929-6	2			2			
B 4336	Houma x B 606-3	10				5	5	
B 4338	A 129-11 x B 3410-22	2			1	1		
B 4342	B 2903-17 x B 1377-78	7			1	5	1	
I 5505	I 801-10 x I 1077-14	3		1		1	1	
I 5572	I 1106-5 x I 1077-W 28-5	1		1				
I 55143	B 595-76 x Osage	1					1	
I 55190	B 2368-4 x B 3131-8	1				1		
B 1514	B 725-61 selfed	1					1	
B 1516	B 2067-52 "	1				1		
B 1525	B 4002-1 "	1			1			
B 1526	B 4005-10 "	1				1		

1/ Rating: 1, no lesions; 2, occasional lesion; 3, 1/2 of leaves affected; 4, 2/3 of leaves showing lesions; 5, all but a few leaves showing blight lesions; 6, plants dead.

Webb table 3. Field resistance to late blight of selected potato seedlings immune to the "O" race. 1958. Aroostook Farm, Presque Isle, Maine.

Pedigree	Parentage	Number Seedlings	Relative resistance 14 days after infection					
			1	2	3	4	5	6
B 4229	Cayuga x Cherokee	7			5	1		1
B 4231	" x B 3319-30							
B 4233	Delus x Cherokee	5				1	3	1
B 4235	Delus x B 4005-10	4			1	1	2	
B 4238	Houma x B 3299-13							
B 4241	Kennebec x "	6			2	2	2	
B 4242	Menominee x B 3319-30							
B 4244	Merrimack x B 3139-24	5			1	2	2	
B 4245	" x Ac 26032	14	10		2	1	1	
B 4246	Mohawk x Merrimack							
B 4249	" x Ac 26032	1					1	
B 4250	ND 457-1 x B 3139-24	3					3	
B 4252	" x Ac 26031	1	1					
B 4254	Record x B 3556-12							

Webb table 3. (Continued)

Pedigree	Parentage	Number Seedlings	Relative resistance 14 days after infection					
			1	2	3	4	5	6
B 4255	Sebago x Cherokee	2			1	1		
B 4259	Sequoia x Cayuga							
B 4262	B 24-58 x B 4005-10							
B 4265	B 24-78 x B 3646-11	5			2	1	1	
B 4267	96-56 x Ac 26031	17			5	6	3	3
B 4269	B 355-24 x B 3139-24	23			1	3	12	7
B 4270	" x B 4005-10	2			1	1		
B 4271	" x Ac 26031	2	1				1	
B 4272	B 595-76 x Cherokee	8				3	4	1
B 4273	" x ND 457-1	14						
B 4274	" x B 2067-52	5					2	3
B 4275	" x B 3139-24	8				3	3	2
B 4279	B 606-37 x ND 457-1	12						
B 4280	" x B 3139-24	3				2		1
B 4281	" x B 3309-8	12			1	6	5	
B 4283	627-164 x B 3139-24	8				3	1	4
B 4285	B 725-6 x Merrimack	14		1	2	6	5	
B 4286	" x B 3139-24	13				2	5	6
B 4287	" x B 4005-10							
B 4288	792-88 x Ac 26032	6	1	1		1	2	2
B 4289	B 902-2 x Merrimack	4			2	2		
B 4290	" x B 3139-24	9				3	5	1
B 4291	B 922-3 x B 3556-12	19			2	2	10	5
B 4294	B 929-32 x B 3139-24	22				8	3	11
B 4296	" x B 4005-10	17			4	5	5	3
B 4298	B 991-14 x B 3139-24	6				2	2	2
B 4299	" x B 3556-12	28			3	2	6	17
B 4300	B 2067-52 x B 3209-35							
B 4302	B 2922-26 x B 3672-3	25				10	8	7
B 4303	B 3097-82 x Menominee	11				3	7	1
B 4304	" x ND 457-1	28				7	13	8
B 4305	" x B 3299-13	18				7	4	7
B 4306	B 3139-24 x B 3556-12	2				1	1	
B 4307	B 3139-24 x B 4005-10	5				2		3
B 4309	B 3209-35 x B 2067-52							
B 4312	B 3209-8 x B 3139-24	19			1	2	4	12
B 4313	KB 3347-39 x Menominee							
B 4314	B 3403-10 x B 3139-24	12			1	2	3	6
B 4315	B 3428-4 x B 3556-12	10				1	3	6
B 4316	B 3454-5 x B 3139-24	8				1	3	4
B 4317	B 3556-12 x B 3209-35	4				2		2
B 4318	B 3641-18 x B 2067-52	18						
B 4321	B 3707-4 x B 3139-24	18				3	8	9
B 4323	B 3707-4 x B 4005-10	4				1	3	
B 4326	B 4002-1 x B 2067-52							
B 4327	" x Earlaine							
B 4328	B 4005-102 x Katahdin							

Webb table 3. (continued)

Pedigree	Parentage	Number Seedlings	Relative resistance 14 days after infection					
			1	2	3	4	5	6
B 4329	47156 x B 3556-12	10				1	3	6
B 4330	Ac. 26033 x Cherokee	5				3	1	1
B 4331	Hindenburg x Menominee							
B 4332	" x B 929-6							
B 4336	Houma x B 606-3	5				3	1	1
B 4338	A 129-11 x B 3410-22	5		1		2	2	
B 4342	B 2903-17 x B 1377-78							
B 4344	Houma x Ac 25953	4			1	2		1
B 4345	HSO-2 x Earlaine	2					2	
B 4346	" x Ac 25976	3	2					1
B 4347	Menominee x Ac 25953	13			2	5	4	2
B 4348	Mohawk x "	7				3	3	1
B 4352	Sebago x "	4			1	3		
B 4354	TI-5 x "	7	4		1	2		
B 4355	" x Ac 26031	6	3			2	1	
B 4357	96056 x Ac 25953	3		1			2	
B 4359	B 595-76 x Ac 25953	5			2	2	1	
B 4360	" x Ac 26031	3			1	1		1
B 4362	B 922-3 x 96-56	8				2		6
B 4363	B 922-6 x Ac 26031	5	1		1			3
B 4365	B 3641-18 x Ac 25953	3				2		
B 4367	B 3707-4 x Ac 26031	2				1	1	
B 4368	B 3720-9 x Ac 25953	2				1	1	
B 4369	47156 x "	7			1	6		
B 4370	Ac 25953 x TI-5	2	2					
B 4371	Ac 25976 x HSO-2	13	6	2	2	1		2
B 4372	Ac 25977 x "	32	14	3	4			
B 4373	" x Katahdin	10				8	2	
B 4376	B 595-76 x Menominee	3				1	2	
I 5505	I 801-10 x I 1077-14	5				3	1	1
I 5572	I 1106-5 x I 1077-W 28-5							
I 55143	B 595-76 x Osage	1				1		
I 55150	" x I 1077-W 28-25	2		1		1		
I 55190	B 2368-4 x B 3131-8							
B 1514	B 725-61 selfed							
B 1516	B 2067-52 selfed							
B 1518	B 3014-10 "	1						1
B 1525	B 4002-1 "							
B 1526	B 4005-10 "							
	Kennebec	1					1	
	Merrimack	1			1			

Webb table 4. Field resistance of some domestic potato varieties to the late blight fungus. 1958. Aroostook Farm, Presque Isle, Maine.

Moderately[1/] resistant	Not[3/] resistant	Not[3/] resistant
Boone *	American Giant	Norkota
Calrose	Antigo	Nordak
Kennebec *	Burbank	Norgleam
Menominee	Canso	Norland
Merrimack *	Canus	Osseo
Ontario	Chippewa	Pawnee
Russet Sebago	Chisago	Placid
Saco *	Columbia Russet	Potomac
Saranac	Dazoc	Progress
Sebago	Delus *	Red Beauty
Saranac	De Sota	Redburt
Sequoia	Earlaine	Redglo
	Earlaine 2	Redkote
Slightly[2/] resistant	Early Gem	Red LaSoda
	Essex *	Red McClure
	Garnet Chili	Red Warba
Canoga	Golden	Rukat
Cayuga	Green Mountain	Rural New Yorker
Cherokee	Harmony Beauty	Rushmore
Erie	Houma	Russet Rural
Keswick *	Irish Cobbler	Satapa
Onaway *	Kasota	Sheridan
Osage	Katahdin	Tawa *
Pontiac	Knik	Teton
Plymouth *	La Salle	Triumph
Pungo *	La Soda	Warba
Red Pontiac	Manota	Waseca
Spaulding Rose	Marygold	White Cloud
	Mesaba	White Rose
	Mohawk	Wisconsin Pride
		Yampa

1/ 1/2-2/3 leaves affected 28 days after inoculation.
2/ Only a few leaves not affected 28 days after inoculation.
3/ Plants dead 28 days after inoculation.
* Immune to the "o" race.
Plot size - Duplicate planting of 3-hill lots.

Virus A resistance

Two hundred and twenty-four selections were screened for resistance to virus A. Webb table 5 summarizes the results. Seventy-eight selections were graft-hypersensitive and sixty-eight were aphid-immune to the virus.

Webb table 5. Summary of test for resistance to virus A. 1957-58. Beltsville, Md.

Pedigree	No. Selections	Parentage	Selections: Graft-hyper-sensitive	Selections: sus-ceptible	Selections: Aphid- Res.	Selections: Aphid- Sus.
B 4076	4	PI 205623 x Katahdin		4	2	2
B 4077	3	PI 205624 x "		3	2	1
B 4079	2	PI 205623 x Merrimack		2	2	
B 4080	1	PI 205624 x "	1			
B 4082	5	Cherokee x B 81-40		5		5
B 4083	5	Chippewa x Cherokee		5	3	2
B 4084	9	" x B 81-40		9	6	3
B 4085	5	Cherokee x B 28-170		5	2	3
B 4087	4	Early Gem x B 2834-3		4	3	1
B 4088	2	Houma x "	1	1	1	
B 4090	4	Kennebec x B 81-40		4	1	3
B 4093	10	Menominee x B 881-12	2	8	3	5
B 4094	9	Russet Rural x B 3310-5		9	9	
B 4097	1	Saco x 47156	1			
B 4099	1	B 595-76 x 47156	1			
B 4100	5	792-88 x B 2359-84	3	2	2	
B 4102	1	792-94 x Katahdin	1			
B 4105	5	" x B 3139-24	4	1	1	
B 4108	3	B 982-11 x B 3186-6	3			
B 4109	1	B 982-23 x "	1			
B 4110	1	" x B 3209-35		1	1	
B 4113	5	B 1395-57 x B 2834-3	4	1		1
B 4114	6	B 2331-5 x Dyk. 2336	6			
B 4116	6	B 2359-84 x B 2834-3	4	2		2
B 4119	7	B 2368-4 x B 3186-6	3	4		4
B 4120	2	" x B 2162-36		2	1	1
B 4128	6	B 2962-6 x B 2969-15	6			
B 4130	5	B 3014-10 x B 929-32	4	1	1	
B 4132	10	B 3097-82 x Katahdin		10	6	4
B 4134	8	B 3186-6 x B 3139-24	6	2	1	1
B 4135	4	B 3139-24 x Cherokee	1	3	2	1
B 4138	1	B 3209-35 x B 3186-6		1	1	
B 4144	1	47156 x B 2834-3		1	1	
B 4145	2	Houma x B 3195-3		2	2	
B 4146	2	Katahdin x 1376-2		2		2
B 4147	1	" x 1376-6		1		1
B 4149	2	Marygold x B 24-58		2	1	1
B 4150	1	Merrimack x 1376-6		1	1	
B 4151	2	" x 1376-13	1	1		1
B 4152	1	B 24-58 x 1376-2		1		1

Webb table 5. (Continued)

Pedigree	No. Selections	Parentage	Selections: Graft-hyper-sensitive	Selections: sus-ceptible	Selections: Aphid- Res.	Selections: Aphid- Sus.
B 4153	1	B 24-58 x 1376-6		1		1
B 4154	1	" x B 3195-3		1		1
B 4155	1	B 24-78 x B 3195-3		1		1
B 4158	2	B 595-76 x 1376-2		2	2	
B 4159	7	B 595-76 x 1376-6		7	4	3
B 4160	2	" x B 3508-8	1	1		1
B 4161	1	X 792-88 x 1376-2	1			
B 4166	2	B 962-3 x B 355-24		2		2
B 4167	1	B 2837-12 x "		1		1
B 4168	3	B 3097-82 x B 2962-6	2	1		1
B 4170	2	B 3139-24 x B 3201-32	1	1	1	
B 4171	1	B 3195-3 x B 355-24		1		1
B 4176	2	B 3508-8 x Menominee	2			
B 4180	1	B 3516-11 x B 355-24		1		1
B 4190	1	B 3139-24 x Ac. 25976	1			
B 4194	1	B 3406-3 x "		1	1	
B 4207	1	B 3508-8 x Dyk. 5230		1		1
B 4209	1	B 3516-11 x B 355-24		1		1
B 4212	4	" x Dyk. 5230		4		4
B 4214	2	B 3516-11 x Ac. 25976	1	1		1
B 4215	3	3 VW-9 x Ac. 25959	2	1	1	
B 4216	1	41956 x A 163-88	1			
B 4217	1	A 125-12 x B 3200-2		1		1
B 1495	1	B 929-32 (X)		1	1	
B 1496	11	B 2368-4 (X)	7	4	2	2
B 1497	1	" (X)		1	1	
B 1500	1	B 3508-8 (X)	1			
B 1501	5	41956 (X) ?	5			
B 1505	2	Menominee (X)		2		2
B 1506	1	B 3200-2 (X)		1		1
50B9	1	Teton x B 446-8				
OB 2905	1	B 301-29 x B 355-24		1		1
Green Mountain	5			5		5

Virus X resistance

Eight hundred and seventeen selections were screened for resistance to virus X by mechanical inoculation with a virulent strain of the virus. Webb table 6 summarizes the results. One hundred and ninety selections were highly resistant to infection.

Webb table 6. Reaction of selected potato seedlings to virus X, 1958. Presque Isle, Maine.

Pedigree	Parentage	Number[1/] Seedlings	Number Resistant	Number Susceptible
B 4229	Cayuga x Cherokee	1		1
B 4231	Cayuga x B 3319-3	5	1	4
B 4238	Houma x B 3299-13	11	10	1
B 4241	Kennebec x B 3299-13	13	5	8
B 4242	Menominee x B 3319-30	12	5	7
B 4244	Merrimack x B 3139-24	10		10
B 4245	AC 26032	18		18
B 4250	ND 457-1 x B 3139-24	10		10
B 4254	Record x B 3556-12	1		1
B 4271	B 355-24 x AC 26031	2		2
B 4272	B 595-76 x Cherokee	11	6	5
B 4273	" x ND 457-1	25	13	12
B 4274	" x B 2067-52	10	6	4
B 4275	" x B 2067-52	17	4	13
B 4279	B 606-67 x ND 457-1	36	21	14
B 4280	B 606-37 x B 3139-24	4	2	2
B 4281	" x B 3309-8	12	5	7
B 4283	627-164 x B 3139-24	16		16
B 4285	B 725-6 x Merrimack	21		21
B 4288	792-88 x AC 26032	12	8	4
B 4289	B 902-2 x Merrimack	11		11
B 4290	" x B 3139-24	26		26
B 4291	B 922-3 x B 3556-12	27	17	10
B 4294	B 929-32 x B 3139-24	33		33
B 4296	" x B 4005-10	23		23
B 4298	B 991-14 x B 3139-24	13		13
B 4299	" x B 3556-12	29	10	19
B 4300	B 2067-52 x B 3209-35	10		10
B 4302	B 2922-2 x B 3672-3	27		27
B 4303	B 3097-82 x Menominee	13		13
B 4304	" x ND 457-1	33		33
B 4305	" x B 3299-13	21		13
B 4306	B 3139-24 x B 3556-12	2		2
B 4307	" x B 4005-10	10		10
B 4309	B 3209-35 x B 2067-52	5		5
B 4312	B 3309-8 x B 3139-24	21		21
B 4315	B 4328-4 x B 3556-12	10	8	2
B 4317	B 3556-12 x B 3209-35	15	6	9
B 4323	B 3707-4 x B 4005-10	5		5
B 4326	B 4002-1 x B 2067-52	1	1	
B 4327	" x Earlaine	6	5	1
B 4328	B 4005-102 x Katahdin	2	1	1
B 4328	47156 x B 3556-12	14	9	5
B 4330	AC 26033 x Cherokee	5		5
B 4331	Hindenburg x Menominee	3		3
B 2896-10		1		1
B 2968		2		2
B 4286	B 725-6 x B 3139-24	[illegible]		[illegible]

Webb table 6. (Continued)

Pedigree	Parentage	Number1/ Seedlings	Number Resistant	Number Susceptible
B 2997-9		1		1
B 922-3		1		1
B 3646-11		1		1
Earlaine		1		1
B 2368-4		1		1
B 3454-5		1		1

1/ Two plants of each seedling were inoculated in the greenhouse with a virulent strain of virus X carried in Chippewa potatoes.

Virus Y resistance

Six hundred and two selections and varieties were screened for resistance to infection with virus Y by depositing viruliferous aphids (Myzus persicae) /Sulz/) on plants of 3 hills of each in the field. Selections not showing symptoms in the field were indexed in the greenhouse. Webb table 7 summarizes the results. Selections from parental combinations B 3097-82 x ND 457-1, B 3641-18 x B 2067-52 and B 3641-18 x Ac 25953 and selections B 2067-52, Ac 222943 and Ac 222952 and leafroll-resistant selections x 752-10, B 24-76, B 872-29, B 922-3 and B 2185-25 proved resistant to infection under conditions of the test.

Webb table 7. Reaction of selected potato seedlings to aphid1/ inoculation with virus Y under field conditions. 1958. Presque Isle, Maine.

Pedigree	Parentage	Number Seedlings	Number Resistant	Number Susceptible
B 4229	Cayuga x Cherokee	1		1
B 4242	Menominee x B 3319-30	8		8
B 4244	Merrimack x B 3139-24	10	5	5
B 4245	" x Ac 26032	18	2	16
B 4235	Delus x B 4005-10	7		7
B 4241	Kennebec x B 3299-13	1		1
B 4249	Mohawk x Ac 26032	2		2
B 4250	ND 457-1 x B 3139-24	13	4	9
B 4251	" x B 3209-35	5	3	2
B 4252	" x Ac 26031	1		1
B 4265	B 24-78 x B 3646-11	7	1	6
B 4269	B 355-24 x B 3139-24	43	21	22
B 4274	B 595-76 x B 2067-52	10		10
B 4279	B 606-37 x ND 457-1	36	10	26
B 4280	B 606-37 x B 3139-24	4	1	3
B 4281	" x B 3309-8	12	4	8
B 4286	B 725-6 x B 3139-24	49	12	37

Webb table 7. (Continued)

Pedigree	Parentage	Number Seedlings	Number Resistant	Number Susceptible
B 4290	B 902-2 x B 3139-24	26	10	16
B 4291	B 922-3 x B 3556-12	27	4	23
B 4294	B 929-32 x B 3139-24	33	10	23
B 4298	B 991-14 x "	13	1	12
B 3400	B 2067-52 x B 3209-35	10	9	1
B 4304	B 3097-82 x ND 457-1	33	13	20
B 4306	B 3139-24 x B 3556-12	2		2
B 4307	" x B 4005-10	10		10
B 4309	B 3209-35 x B 2067-52	5	5	
B 4312	B 3309-8 x B 3139-24	21	20	1
B 4313	KB 3347-29 x Menominee	4		4
B 4314	B 3403-10 x B 3139-24	13	11	2
B 4316	B 3454-5 x "	24	3	21
B 4317	B 3556-12 x B 3209-35	15	9	6
B 4318	B 3641-18 x B 2067-52	18	17	1
B 4321	B 3707-4 x B 3139-24	25	12	13
B 4342	B 2903-17 x KB 1377-78	7	1	6
B 4344	Houma x Ac 2595-3	4		4
B 4345	HSO-2 x Earlaine	2		2
B 4346	" x Ac 25976	3		3
B 4362	B 922-3 x 96-56	8	3	5
B 4363	B 922-6 x Ac 26031	5	1	4
B 4365	B 3641-18 x Ac 25953	3	3	
B 4367	B 3707-4 x Ac 26031	2		2
B 4368	B 3720-9 x Ac 25953	2		2
B 4376	B 595-76 x Menominee	3		3
B 1514-1	B 725-1 selfed	1		1
B 1516-1	B 2067-52 selfed	1	1	
B 1518-1	B 3014-10 "	1		1
B 1525-1	B 4002-1 "	1		1
B 1526-1	B 4005-10 selfed	1		1
54.4-53-1		1		1
" -5		1		1
50.4-52-40		1		1
Ac 26031		1		1
Ac 26033		1		1
Ac 26037		1		1
Ac 26040		1		1
OB 3031-1		1		1
NDB 3081-21		1	1	
B 355-24		1	1	
B 2098-29		1		1
B 2331-5		1	1	
B 2340-2		1		1
B 2968-7		1		1
" -50		1		1
B 2997-9		1	1	
B 1299-5		1		1
B 922-3		1	1	

Webb table 7. (Continued)

Pedigree	Parentage	Number Seedlings	Number Resistant	Number Susceptible
Cayuga		1		1
Cherokee		1		1
Houma		1		1
Katahdin		1		1
Menominee		1		1
Mohawk		1		1
Sebago		1		1
Delus		1		1
B 2185-25		1	1	
Redburt		1	1	
Sequoia		1		1
B 922-6		1		1
Knik		1		1
47156		1		1
Earlaine		1		1
96-56		1		1
B 73-3		1		1
B 595-76		1		1
B 2368-4		1		1
B 355-35		1		1
B 2922-26		1		1
B 3319-30		1		1
B 3454-5		1		1
B 3556-11		1		1
Kennebec		1		1
B 24-76		1	1	
B 872-29		1	1	
X 752-10		1	1	
Shipworth		1		1
Skerry Champion		1		1
Chippewa		1		1
Ac 203906		1		1
Ac 222943		1	1	
Ac 222952		1	1	
Green Mountain 2/		11		11

1/ *Myzus persicae* (Sulz.)
2/ Three hills after each group of 50 seedlings. All 3 plants in each plot infected.

Planted May 7, 1958.
Inoculated June 18-27, 1958.
Read August 6, 1958.

INTER-REGIONAL POTATO INTRODUCTION PROJECT
(Cooperative State-Federal Project)
R. W. Hougas and R. W. Ross

In accordance with the recommendation of the IR-1 Technical Committee, the inventory of the Solanum stocks available in the Inter-Regional Collection was published, this year, in bulletin form. The inventory includes pertinent information (i.e. source, taxonomy, chromosome number, resistance to diseases, resistance to insects, etc.) concerning the stocks listed. Pertinent publications are also noted. Copies of the inventory are presently being mailed to potato researchers. Additional copies are available and may be obtained by writing to the Potato Introduction Station, Sturgeon Bay, Wisconsin.

Eighty-four new stocks were received in 1958 through formal Solanum expeditions to 1) Mexico and South America (expedition led by Dr. D. S. Correll of the Texas Research Foundation) and 2) Mexico and Central America (led by Dr. J. G. Hawkes, University of Birmingham, England). Only a portion of the seeds and tubers collected through these expeditions are presently in the Inter-Regional Collection; the balance is being processed through quarantine at Glenn Dale, Maryland and will be sent to the Potato Introduction Station in 1959.

Shipments of seeds and tubers were made during the past year to 16 States and 7 foreign countries. Total shipments included 240 seed samples, 638 tuber samples and 31 dried foliage samples.

Accelerated progress in the evaluation and use of the Solanum introductions has been made through the recently established cooperative project between the Vegetables and Ornamentals Research Branch of USDA and the Wisconsin Agricultural Experiment Station. The principal areas of investigation in the new project are genetics, cytogenetics and pathology.

The first objective of the pathology program has been to screen the stocks of the Collection for their reaction to the major diseases of the common potato. The work of screening for resistance to virus A, virus X, leafroll virus, spindle-tuber virus and Verticillium has continued. Stocks with resistance to each of the diseases incited by these agents has been found. Multiple resistance to the diseases under test was found in some introductions. Details of this work are available in a technical article "Preliminary Evaluation of Solanum Species and Species Hybrids for Resistance to Disease" Plant Disease Reporter (in press).

The primary objective of the genetic and cytogenetic program is to provide basic information, techniques and hybrids that will be useful to potato breeders of the nation in developing improved commercial varieties. The genetic and cytogenetic program is currently placing emphasis upon problems related to gene transfer from the numerous wild and cultivated tuber-bearing Solanum species to the common potato, S. tuberosum. Interspecific crosses have been used as a tool, in this program, to obtain haploids (2n=24) of the

common potato (2n=48). Since more than 60 percent of the tuber-bearing Solanum species are diploid (2n=24), haploids (2n=24) of the common potato (2n=48) offer rich promise in expediting gene transfer from this vast reservoir of germ plasm to the common potato. Such haploids also offer a unique opportunity for accelerated genetic and cytogenetic study of the common potato as well as promise of new, efficient approaches to potato breeding.

GENETICS AND CYTOGENETICS OF THE TUBER-BEARING SOLANUM SPECIES

(Cooperative ARS, USDA and Wisconsin Station)

R. W. Hougas and S. J. Peloquin

The work of the project in 1958 was primarily concerned with the study of haploidy in the common potato. The 29 haploids (2n=24) of S. tuberosum (2n=48) obtained in 1957 were propagated and studied in the greenhouse and field in 1958. Studies with the haploid plants included morphological characters, meiosis and intra- and inter-specific crossability.

Twenty of the original 29 haploids have flowered to date. Nineteen of them have been used successfully as female parents in intra-haploid matings or in matings with tuber-bearing diploid (2n=24) Solanum species. Two of the haploids are highly male fertile. Pollen stainability of the haploids ranged from 0-20 percent for the male sterile individuals and from 60-80 percent for the male fertile individuals.

Seed has been obtained following matings of the haploids with 23 diploid Solanum species (ajanhuiri, canasense, candoleanum, chacoense, famatinae, goniocalyx, kurtzianum, medians, megistacrolobum, neohawkesii, pampasense, phureja, raphanifolium, sancta-rosae, simplicifolium, soukupii, sparsipilum, stenotomum, tarijense, toralapanum, vernei, verrucosum, xerophyllum). The total number of seed obtained from such matings is upwards of 105,000. Small populations (25-50) of F_1 seedlings have been grown from 88 of these combinations. The majority of the F_1 plants are vigorous. F_2 and BC_1 populations of five combinations have been grown.

In limited trials to date, no viable seed has been obtained following matings of the S. tuberosum haploids with S. bulbocastanum, S. cardiophyllum, S. clarum, S. ehrenbergii, S. jamesii, S. lignicaule, S. morelliforme, S. pinnatisectum and S. polyadenium.

Matings between five S. tuberosum varieties (Cherokee, Early Gem, Katahdin, Kennebec and Merrimac) and S. tuberosum haploids have been made. Seed set is very low, in the limited trials to date, following such matings.

Large stockpiles of haploids, representing the wide range of germ plasm in S. tuberosum are needed if the potential of such materials for research in genetics, cytogenetics and potato breeding is to be realized. Consequently the work program of the past year has included a search for haploid individuals on a much broader basis than in previous years. Seventeen named varieties and 38 selected breeding stocks of S. tuberosum were used as females in inter-specific matings designed to make possible the macroscopic recognition of haploids arising through female parthenogenesis.

Studies were also undertaken to explore the effect of various factors on haploid frequency in inter-specific matings.

In 1956 the inter-specific pollinations were made on S. tuberosum plants growing in the field. Because of the low seed set per pollination realized

in 1956, resulting in considerable measure through dropping of the very young fruit, attempts were made in 1957 to increase fruit retention. In preliminary trials (Amer. Pot. Jour. 35:726) marked increase in seed-per-pollination, following inter-specific pollinations, was obtained through use of the decapitation technique described by McLean (Amer. Pot. Jour. 29:206-211). This technique was utilized extensively (65,000+ pollinations) in 1958 trials and resulted in increased seed per pollination. The seed from these pollinations is being extracted and will be planted in 1959.

Since the pollinator is known to affect the frequency of haploidy in other plants, a search for efficient "haploid-inductors" in Solanum has been initiated. Differences which may be significant have been noted in limited, preliminary trials. The 1958 "pollinator" trials include a survey of 29 selections of the tuber-bearing Solanum species.

NORTH CENTRAL REGIONAL TRIALS 1958

August E. Kehr, Lind Sanford and Cooperators 1/

The North Central Regional trials were first established in their present form in 1950. This year marks the completion of the 8th season. Potato workers in the North Central area can take a huge measure of pride in these trials, and in the eight years they have become a most important segment of the potato improvement picture. This year the group unanimously voted to extend membership to include Louisiana, with Dr. Julian C. Miller as the official representative.

From the 1957 trials one selection has been named and released as follows:

Progeny No.	Release Name	Introduced by
Neb. 82-49-1X	Excel	Nebraska

Environmental Conditions: The tests were conducted on peat soils in Indiana and Iowa and on mineral soils in the other eight States. Fertilizer applications and spacing between the hills and between the rows are based upon local conditions and soil requirements.

Planting dates varied from March 26 in Kansas to June 24 in Nebraska. Days to harvest are as follows:

	Date Planted	Date Harvested	Total Days to Harvest
Indiana	May 7	October 15	161
Iowa	April 17	September 19	155
Kansas	March 26	July 21	117
Michigan	May 19	September 26	130
Minnesota	May 15	September 19	127
Missouri	March 28	July 23	117
Nebraska	June 24	October 8	106
North Dakota	May 9	September 11	125
Ohio	May 16	October 15	152
Wisconsin	June 16	October 1	116

Yields: In the early group Neb. 156.48-2X was the most consistent high yielding selection in the ten locations with an average of 552 bushels per acre. The best yielding early check variety was Triumph with an average yield of 458 bushels per acre.

In the late group no selections were superior to Red Pontiac.

Maturity: The earliest maturing selections were Norland (1.8), and B 605-10 (2.2). These were both earlier than the early checks Cobbler (2.3) and Triumph (2.4). The selection Ag. 29 (2.3) was as early as these checks.

1/ Indiana, H. T. Erickson; Iowa, A. E. Kehr; Kansas, J. K. Greig; Michigan, N. R. Thompson; Minnesota, F. I. Lauer; Missouri, V. N. Lambeth; Nebraska, H. O. Werner; North Dakota, R. H. Johanson; Ohio, Donald Comin; Wisconsin, G. H. Rieman.

Percentage Solids: Location had a greater effect on percentage of total solids than selections as shown below:

	Highest	Lowest	Differences
Range of Selections	20.0	16.4	3.6
Range of Locations	23.4	15.2	8.2

Selections with the highest average total solids over-all locations were I 801-10 (20.0), I 1111-10 (19.7), I 8140-1 (19.3), Ag. 120 (19.1), Excel (19.0) and Wis. X137.52 (18.9). These were all higher than the highest check (Cobbler 18.1).

Scab Resistance: The most outstanding selection for overall scab resistance was Ag. 29, which was reported with no scab more serious than a 1 type scab. Others with high resistance were N.D. 3631-6 and I 8140-1 which had no scab more serious than type 2.

Overall Merit Ratings: Merit ratings made by the ten States were as follows:

Progeny	Total No. Merit Points	Progeny	Total No. Merit Points
Norland	29	B 2894-24	7
N.D. 3324-2	25	N.D. 3631-6	6
Neb. 156.48-2X	14	B 605-10	6
Ag. 120	12	Ag. 29	6
B 2368-4	12	I 801-10	6
Neb. 315.48-3X	11	Wis. X137.52	6

North Central Table 1

Indiana. Cooperator - H. T. Erickson. Location - Walkerton, Ind. Soil type - Muck. Fertilizer - 1000 lbs/A 0-20-20. Spacing - Hills 12", Rows 36". Date planted - May 7, 1958. Date harvested - October 15, 1958.

REMARKS - Soil was dry until early June. Rainfall was adequate thereafter and never excessive. Temperatures were generally cooler than normal. An excellent growing season. Weekly sprays of Dithane or Copper Sulfate and DDT or Dieldrin were used from about June 1 until September 20. There was some Late Blight despite the spray schedule. The vines were killed by mowing on September 25. Specific gravity was determined from an 8-pound sample of "A" size tubers with a hydrometer. Maturity data were collected September 4.

Iowa. Cooperator - A. E. Kehr. Location - Clear Lake, Iowa. Soil type - Neutral Peat. Fertilizer - 1200 lbs. 0-9-27. Spacing - Hills 12", Rows 36". Date planted - April 17, 1958. Date harvested - September 19, 1958.

REMARKS - Rainfall was high in the early part of the season and temperatures cool. Late blight was rampant in plots in early July, but disappeared in late July. Dithane and D.D.T. were applied at 5 day intervals beginning June 20th. The vines were killed with Sodium Arsenite spray on September 7.

Kansas. Cooperator - J. K. Greig. Location - Manhattan, Kansas. Soil type - Sandy-Loam. Fertilizer - 31-83-0. Spacing - Hills 12", Rows 36". Date planted - March 26, 1958. Date harvested - July 21, 1958.

REMARKS.

	Temperature			Rainfall
	Max.	Min.	Ave.	Inches
April	66	41	53	1.42
May	79	54	67	2.61
June	86	61	74	7.94
July	87	65	76	9.24 (until harvest)

These potatoes were irrigated on June 2 when 1 1/2 acre inches or water was applied. A 4.49" downpour on July 3 washed the ridges down and exposed many potatoes. D.D.T., Zineb, Manzate, fixed copper and Malathion were used as needed to control insects and diseases. The specific gravity was determined with a potato hydrometer. The value for the Red Pontiac variety was estimated. The specific gravity was determined on only two replications.

Michigan. Cooperator - N. R. Thompson. Location - Lake City, Michigan. Soil type - Iosco Sandy Loam. Fertilizer - 800 lbs. 5-20-20. Spacing - Hills 12", Rows 36". Date planted - May 19, 1958. Date harvested - September 26, 1958.

REMARKS - Cool, dry season, irrigated through July and August. D.D.T. and Malathion + D.D.T. were applied. The vines were killed September 12, 1958.

Minnesota. Cooperator - F. I. Lauer. Location - Duluth, Minnesota. Soil type - Silt Loam. Fertilizer - 700 lbs. 8-16-16/A. Spacing - Hills 18", Rows 42". Date planted - May 15, 1958. Date harvested - September 19, 1958.

REMARKS - Rainfall was below average during the latter part of July and August. Two spray applications were applied with Red River mix the last of July and the first part of August. A hydrometer was used to determine specific gravity. Scab readings were made at Grand Rapids, Minnesota.

Missouri. Cooperator - V. N. Lambeth. Location - Franklin, Missouri. Soil type - Menfro Silt Loam. Fertilization - Plowed down 28-28-28, Banded 14-14-14. Spacing - Hills 12", Rows 40". Date planted - March 28, 1958. Date harvested - July 23, 1958.

REMARKS - Temperature - Unseasonably low throughout the season. Low soil temperature and rain delayed planting 2 weeks, delayed sprout emergence and contributed to poor plant stand. Rainfall - Excessive after tuber set.

Record breaking precipitation in June and July. Enlarged lenticels contribute to tuber rots. Soil application of dieldrin 1 1/2 pints per acre preplanting. Malathion-Methoxychlor-Zineb applied at approximately 10-day intervals. No chemical vine killers were used. The tops were removed 2 days before harvest with a rotary mower. Specific gravity readings on tubers with field heat in. Used hydrometer, four 8-pound samples, one from each field block. Planted on clean soil in new location - no trace of scab of any type.

Nebraska. Cooperator - H. O. Werner. Location - Hemingford, Nebraska. Soil type - Rosebud very fine sandy loam (shallow phase). Fertilizer - . Spacing - Hills 12", Rows 36". Date planted - Juen 24, 1958. Date harvested - October 8, 1958.

REMARKS -

	July	August	September
Rainfall	1.59 + .7	1.30 -.19	.27 -.95
Mean Temp. (Max.)	81.4	88.8	79.4

The land was in alfalfa several years prior to this crop. The field was irrigated four times. Spraying with insecticides and fungicides was adequate to control insects and diseases. Vines of all except the earliest varieties were still green when almost completely frosted September 28. Specific gravity was taken with a potato hydrometer, one 8 pound sample from each replicate. Field operations by Richard Miyoshi. Reported by H. O. Werner.

North Dakota - Cooperator - R. H. Johansen. Location - Grand Forks, North Dakota. Soil type - Bearden clay loam. Fertilizer - 200 lbs./A 16-16-8. Spacing - Hills 12", Rows 38". Date planted - May 9, 1958. Date harvested - September 11, 1958.

REMARKS - Rainfall was near normal and temperatures quite cool during the growing season. Weather dry and warm at harvest. Environmental factors were excellent for potatoes. The plots were dusted regularly with DDT and toxaphene with later applications of dithane. Vines were killed by roto-beating on September 9. Specific gravity was determined by the use of the potato hydrometer. Pythium leak was a common disease in several selections and varieties.

Ohio. Cooperator - Donald Comin. Location - Wooster, Ohio. Soil type - Wooster silt loam. Fertilizer - 1200 lbs./A 5-10-10, 600 lbs./A 12-12-12. Spacing - Hills 11", Rows 36". Date planted - May 16, 1958. Date harvested - October 15, 1958.

REMARKS - Rainfall above normal during entire season; slight water damage to plots in July. Temperatures averaged below normal. Rainfall May 3.20, June 7.02, July 10.20, August 4.37, September 2.40. Parzate, DDT, and Dieldrin were applied on a 10 day schedule. In late July and early August, 2 copper sprays alternated with above. A total of eight sprays were applied.

The vines defoliated by harvest time, chopped with rotary mower immediately prior to harvest. Specific gravity determined with potato hydrometer using eight pounds of potatoes from each replication. Grading and specific gravity measurements were made after the potatoes had been in storage two weeks. Most of the vascular discoloration reported was a mild stem and vascular discoloration which seldom penetrated over one-half to three-fourths inch from stem end.

Wisconsin. Cooperator - G. H. Rieman. Location - Rhinelander, Wisconsin. Soil type - Sandy Loam. Fertilizer - 800 lbs./A 5-20-20. Spacing - Hills, 12", Rows 36". Date planted - June 6, 1958. Date harvested - October 1, 1958.

REMARKS - There was no rainfall during the middle of the growing season (August). Parzate and DDT were applied at 7 day intervals. There was a killing frost about one week prior to harvest.

North Central table 2. Yields of U. S. no. 1 and percent of total yields which were U. S. no. 1 size

	Ind.		Iowa		Kans.		Mich.		Minn.		Mo.		Nebr.		N. D.		Ohio		Wisc.		Average	
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct	Bu.	Pct	Bu.	Pct.	Bu.	Pct	Bu.	Pct.	Bu.	Pct.
Early																						
I 1111-10	740	95	454	94	481	97	440	94	174	73	202	76	391	73	297	94	572	91	603	94	435	88
Neb.156.48-2X	1002	92	694	95	484	96	515	94	284	85	300	83	514	85	403	96	739	91	587	90	552	91
Neb.315.48-3X	483	91	546	95	560	98	436	96	296	86	260	63	412	85	352	96	635	89	596	89	458	89
N.D. 3324-2	725	94	519	94	525	96	443	93	195	76	356	80	445	85	346	96	594	89	555	91	470	89
N.D. 3631-6	529	84	353	85	501	97	397	85	100	50	162	54	393	76	304	92	552	96	502	84	379	80
Norland	446	90	316	79	501	96	402	82	256	85	324	78	314	77	307	97	459	86	522	87	385	86
B 2894-24	763	95	427	93	398	94	486	96	257	91	141	54	478	74	239	96	647	90	647	97	448	88
B 605-10	881	95	434	95	464	97	489	95	242	83	270	67	279	67	281	97	598	92	576	95	451	88
Ag. 29	747	95	499	95	336	97	315	90	269	87	289	77	365	76	225	97	596	89	587	95	423	90
Ag. 120	647	93	434	96	436	94	399	98	184	75	294	72	373	76	193	97	595	87	493	93	405	88
Triumph	583	92	460	93	533	94	462	92	220	71	358	71	403	76	298	96	661	90	598	92	458	87
Cobbler	521	90	458	88	452	95	363	91	119	52	353	80	361	77	276	92	504	86	457	88	386	84
Late																						
I 801-10	494	93	598	97	432	97	462	97	269	85	211	71	331	80	261	96	461	88	560	91	408	89
I 8140-1	595	94	594	95	457	96	380	95	187	74	120	51	399	81	251	93	424	85	531	94	394	86
Excel	514	88	469	91	481	92	394	90	199	72	231	61	351	82	306	92	603	83	551	87	410	84
B 2368-4	842	92	676	97	460	96	421	95	386	92	106	59	378	82	392	98	760	91	735	97	516	90
Wis.X137.52	606	92	364	87	433	96	353	95	190	79	214	55	276	72	192	84	616	84	484	94	373	77
Red Pontiac	1124	94	833	98	480	942	552	95	267	80	259	65	429	78	395	98	898	94	728	94	596	89
LSD .05	220		112		124		90		65		62		90		66		159		89			
LSD .01	294		150		165		120		86		83		120		88		213		119			

North Central table 3. Maturity classification.

Early	Ind.	Iowa	Kan.	Mich.	Minn.	Mo.	Nebr.	N. D.	Ohio	Wisc.	Ave.
I 1111-10	4.0	3.6	4.0	3.0	1.5	2.5	4.0	3.0	3.7	3.2	3.2
Neb. 156.48-2X	3.8	3.2	5.0	3.2	2.0	2.3	4.0	3.0	4.0	3.5	3.4
Neb. 315.48-3X	3.0	3.0	3.7	3.0	1.0	2.5	3.0	2.5	3.7	2.7	2.8
N.D. 3324-2	1.8	2.1	4.7	2.5	1.0	2.1	3.0	2.0	2.0	2.9	2.4
N.D. 3631-6	2.8	2.1	3.0	1.7	1.0	2.6	4.0	2.5	3.1	2.5	2.5
Norland	1.5	2.0	2.5	1.5	1.0	2.0	2.0	1.5	1.7	2.1	1.8
B 2894-24	3.8	4.0	5.0	2.0	1.8	2.7	4.0	4.0	4.0	2.7	3.4
B 605-10	3.5	2.1	3.5	2.0	1.3	2.5	1.0	1.8	2.1	2.7	2.2
Ag. 29	3.8	2.0	3.7	1.7	1.3	2.4	2.0	2.0	2.1	2.4	2.3
Ag. 120	4.5	2.6	4.2	2.5	1.3	2.5	2.0	2.8	2.5	2.9	2.8
Triumph	4.0	2.7	3.2	2.7	1.3	2.0	1.0	2.0	2.4	3.2	2.4
Cobbler	2.5	2.5	3.7	2.0	1.0	2.5	2.0	2.0	2.2	2.2	2.3
Late											
I 801-10	3.0	3.9	4.5	3.5	5.0	3.3	3.0	4.0	4.0	3.7	3.8
I 8140-1	2.5	3.5	4.2	3.0	4.5	2.8	3.0	3.5	3.5	4.0	3.4
Excel.	3.3	4.0	4.0	3.5	1.0	3.5	3.0	3.0	4.0	3.5	3.3
B 2368-4	5.0	4.5	4.7	3.5	2.8	3.5	3.0	3.8	4.0	3.5	3.8
Wis. X137.52	4.5	2.4	3.7	3.2	1.0	3.3	2.0	3.0	2.4	2.6	2.8
Red Pontiac	4.8	4.0	4.7	4.0	2.8	3.6	4.0	3.0	4.5	3.5	3.9

1 = Very early
2 = Early
3 = Medium
4 = Late
5 = Very late

North Central table 4. Total solids.

Early	Ind.	Iowa	Kan.	Mich.	Minn.	Mo.	Neb.	N. D.	Ohio	Wis.	Ave.
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
I 1111-10	16.9	17.5	18.4	18.4	22.4	18.2	20.7	24.4	19.0	21.2	19.7
Neb. 156.48-2X	16.0	16.2	16.2	16.0	20.5	14.3	19.4	23.7	18.0	18.8	17.9
Neb. 315.48-3X	15.2	15.6	16.9	17.1	20.5	14.1	19.2	23.7	16.7	19.9	17.9
N.D. 3324-2	16.2	15.0	16.9	17.1	21.2	15.2	19.0	23.5	16.2	19.0	17.9
N.D. 3631-6	15.0	15.0	15.6	14.5	19.7	14.1	18.2	22.2	16.0	18.8	16.9
Norland	14.3	13.7	15.2	15.2	19.2	14.1	17.3	21.2	15.6	18.4	16.4
B 2894-24	14.8	14.8	14.8	15.6	20.1	14.1	18.2	24.0	17.3	19.0	17.3
B 605-10	16.2	14.8	18.0	16.9	18.2	16.2	19.7	23.1	16.9	19.4	17.9
Ag. 29	16.9	15.8	17.5	16.7	21.6	14.5	19.0	23.5	17.3	20.1	18.3
Ag. 120	17.1	16.5	19.0	17.5	19.7	16.7	21.4	24.0	18.8	20.1	19.1
Triumph	14.3	14.1	15.6	16.0	19.0	15.4	18.2	22.0	16.5	18.6	17.0
Cobbler	16.9	16.0	15.8	16.5	19.7	15.4	19.7	23.5	17.5	19.9	18.1
Late											
I 801-10	16.9	18.8	19.0	19.4	22.2	16.2	20.3	24.0	19.9	22.9	20.0
I 8140-1	17.5	18.2	16.9	19.0	21.2	16.7	19.7	24.2	18.8	21.2	19.3
Excel	17.1	17.7	17.3	17.5	21.8	15.2	18.6	23.5	20.5	20.5	19.0
B 2368-4	15.2	16.9	16.5	17.3	19.7	13.9	17.7	22.9	18.0	19.2	17.7
Wis. X137.52	17.5	15.8	18.2	16.9	21.4	15.8	21.4	24.4	18.4	19.7	18.9
Red Pontiac	14.3	14.1	11.2	15.6	19.0	14.1	17.1	22.9	16.7	18.6	16.4
Ave. for location	16.0	15.9	16.6	16.8	20.4	15.2	19.1	23.4	17.7	19.7	

North Central table 5. Scab reactions reported.[1/]

	Ind.		Iowa		Kan.		Mich.		Minn.		Mo.		Neb.		N. D.		Ohio		Wis.	
Early	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.
I 1111-10	4	1	T	3	4	3	0	0	1	2	0	0	0	0	2	2	T	1	0	0
Neb. 156.48-2X	3	2	1	4	2	2	0	0	2	5	0	0	0	0	1	2	T	1	0	0
Neb. 315.48-3X	2	2	T	4	T	1	0	0	1	4	0	0	0	0	T	2	T	1	0	0
N.D. 3324-2	3	1	2	3	2	3	T	3	2	4	0	0	0	0	2	2	T	2	0	0
N.D. 3631-6	2	2	3	2	T	1	0	0	1	2	0	0	0	0	1	2	T	1	0	0
Norland	2	2	1	3	1	2	0	0	2	3	0	0	0	0	T	1	T	1	0	0
B 2894-24	2	4	T	4	2	2	0	0	3	5	0	0	0	0	1	2	T	1	0	0
B 605-10	4	1	1	2	4	2	0	0	2	4	0	0	0	0	T	1	T	1	0	0
Ag. 29	3	1	T	1	1	1	0	0	2	1	0	0	0	0	1	1	T	1	0	0
Ag. 120	3	2	2	3	1	2	0	0	1	2	0	0	0	0	T	1	T	2	0	0
Triumph	2	3	T	3	4	3	T	3	2	5	0	0	0	0	2	3	T	1	0	0
Cobbler	2	2	T	4	3	2			1	5	0	0	1	2	1	2	T	2	0	0
Late																				
I 801-10	3	1	T	3	2	2	0	0	3	3	0	0	0	0	1	1	T	1	0	0
I 8140-1	1	1	T	2	1	2	0	0	1	2	0	0	0	0	T	1	T	1	0	0
Excel	T	3	T	3	1	1	0	0	1	5	0	0	0	0	1	1	T	1	0	0
B 2368-4	1	3	2	3	1	2	0	0	2	5	0	0	0	0	2	3	T	1	0	0
Wis.X137.52	2	2	T	4	2	3	0	0	1	2	0	0	0	0	T	1	T	2	0	0
Red Pontiac	3	2	T	4	2	2	T	2	2	5	0	0	0	0	2	3	T	1	0	0

1/ T = less than 1%
1 = 1 - 20%
2 = 21-40%
3 = 41-60%
4 = 61-80%
5 = 81-100%

Type of Pustule
1 = small, superficial
2 = larger, still superficial
3 = large, rough pustules
4 = large pustule, shallow holes
5 = large pustule, deep holes

North Central table 6. Average external defects.

Variety Early	Scab	Growth cracks	Second growth	Sun Green
	Pct.	Pct.	Pct.	Pct.
I 1111-10	48.3	7.6	3.3	5.0
Neb. 156.48-2X	41.0	4.2	1.9	2.7
Neb. 315.48-3X	31.0	0.7	2.8	5.7
N.D. 3324-2	47.0	1.7	3.9	5.4
N.D. 3631-6	31.8	6.9	0.5	1.2
Norland	37.7	0.4	1.4	2.7
B 2894-24	36.6	4.1	4.0	12.3
B 605-10	37.3	6.2	5.0	6.2
Ag. 29	20.7	1.9	1.9	4.1
Ag. 120	36.0	3.8	0.4	4.1
Triumph	46.4	3.5	5.9	1.8
Cobbler	47.0	1.1	5.1	4.4
Late				
I 801-10	29.7	3.0	3.3	6.2
I 8140-1	27.6	12.1	4.7	8.0
Excel	37.7	1.1	5.5	1.1
B 2368-4	42.0	6.6	1.0	3.8
Wis. X137.52	35.8	3.1	1.0	4.2
Red Pontiac	44.1	2.9	4.3	1.7

North Central table 7. Percent internal defects.

Variety Early	Hollow Heart	Internal Necrosis	Vascular Discoloration	Normal Tuber
	Pct.	Pct.	Pct.	Pct.
I 1111-10	1.4	1.1	8.3	89.4
Neb. 156.48-2X	0.7	3.1	9.3	86.7
Neb. 315.48-3X	1.1	1.7	7.9	89.8
N.D. 3324-2	1.5	2.4	11.4	85.3
N.D. 3631-6	0.0	4.3	12.3	84.4
Norland	0.0	0.5	5.2	94.4
B 2894-24	3.4	0.6	7.4	89.0
B 605-10	1.3	0.8	11.8	86.1
Ag. 29	0.5	0.9	9.5	89.2
Ag. 120	0.6	0.2	6.4	92.8
Triumph	0.8	0.3	10.3	88.6
Cobbler	3.1	2.5	13.9	79.4
Late				
I 801-10	1.4	0.3	10.4	87.9
I 8140-1	4.3	1.0	4.0	91.2
Excel	4.8	0.7	9.1	86.0
B 2368-4	0.4	6.5	11.3	82.1
Wis. X137.52	0.0	0.3	6.6	93.1
Red Pontiac	1.7	0.9	10.1	87.4

North Central table 8. Merit ratings.

Early	Ind.	Iowa	Kan.	Mich.	Minn.	Mo.	Neb.	N. D.	Ohio	Wis.	Total Merit Points
I 1111-10								4			2
Neb. 156.48-2X			5	3			1	2	5		14
Neb. 315.48-3X		5	1		3		5			5	11
N.D. 3324-2	1	1		4		1		3	1		25
N.D. 3631-6			3				3				6
Norland		4	2	2	1	2	4	1		3	29
B 2894-24									4	1	7
B 605-10	4							5	3		6
Ag. 29					4					2	6
Ag. 120	2			1		3					12
Triumph						5					1
Cobbler						4					2
Late											
I 801-10		3			5					4	6
I 8140-1											
Excel	5						2				5
B 2368-4		2			2				2		12
Wis. X137.52	3		4	5							6
Red Pontiac											

Merit Points Determined as follows:

Merit Rating	Merit Points
1	5
2	4
3	3
4	2
5	1

PACIFIC NORTHWEST
Darrel R. Bienz

Variety testing. Over six hundred fifty clones were rated for maturity, verticillium wilt resistance, and plant and tuber type in 1958. Many of these were also tested for *Fusarium eumartii* resistance, scab, leafroll, virus X, and virus A resistance, and for susceptibility to heat necrosis. In addition to the field trials at Aberdeen, tests for one or more of these characteristics were conducted at Parma, Rexburg, Jerome, and Salmon, Idaho, and in the greenhouse at Aberdeen. Also about 10,000 seedlings were grown and from these 400 clones were selected for further testing.

Yield and verticillium wilt resistance of three of the seedling clones which have appeared most promising during the past two years were compared with yield and resistance of Russet Burbank at Rexburg. The results are shown in Bienz Table 1. In regard to A163-4 and A170-9, both of which have appeared promising during previous years, the seed which was used for variety trials at Rexburg and Aberdeen was 100 percent infected with leafroll so these varieties are not included in the table even though they were in the trials. Where healthy seed was used (see the Jerome and Parma, Idaho reports) A170-9 appeared very promising.

Yield and disease resistance of some of the other more promising selections is shown in Bienz table 2. Temperatures at planting time and again during July and August were much above normal and this probably accounts for the early appearance and severity of verticillium wilt and for the low yield of U. S. No. 1 tubers. Also fertilization was purposely kept low to encourage the appearance of verticillium wilt. Most of the tubers which did not make No. 1's were undersize. Since for most of these selections only two reps were grown and for some, results are based on one plot, no statistical analysis was possible.

Bienz table 1. Verticillium index and yield at Rexburg, Idaho, 1958.

	Tuber Type	Vertc. Index	Total Yield	U. S. No.1 Yield
			Sx./A	Sx./A.
A177-54	Lo. Rus.	15**	275	142
A175-7	Ov. Rus.	7**	361**	273**
A180-26	Lo. Rus.	4**	287	144
Rus. Bur.	Lo. Rus.	63	285	106

* Significantly better than Russet Burbank at the .05 level.
** Significantly better than Russet Burbank at the .01 level.

Many of the higher numbered selections have not yet been tested for resistance to the virus diseases so that a blank space in this column does not necessarily mean that the line is susceptible to the viruses listed. Also, for many of these newer lines there has not yet been enough seed to test them at Rexburg.

This year considerably more of the early and medium maturing selections showed verticillium resistance than was the case in previous years. Apparently the correlation between verticillium resistance and lateness is being gradually eliminated.

Bienz table 2. Performance of a number of new potato selections in comparison with some older varieties.

		Verticillium Index			Rexburg					Virus
	Parentage	Rex-burg	Aber-deen	Scab Index	Total Yield	U. S. No. 1's	Tuber Type	Matu-rity	Dry Matter	Disease Resistance
					Sx./A.	Sx./A.				
A31-13	41956 self	5	18	1-4	244	142	Ro.Sm.*	L**	22.4	X & A
A170-9	Rus.Bur. x B986-7		27	0			Lo.Rus.	VL	18.2	
A246-26	E.Gem x B3019-2		18	T			Lo.Rus.	ML	17.9	A?
A376-11	E.Gem x A177-9	43	35	0	233	93	Lo.Rus.	ME	18.2	
A381-11	A116-56 x A124-116		15	0			Lo.Rus.	L	20.2	
A387-6	A179-15 x A177-9	30	23	T	230	145	Ro.Rus.	ML	20.3	X
A394-1	A119-15 x A124-116		8	0			Ov.Rus.	VL	22.1	LR
A394-8	A119-15 x A124-116		47	0	253	139	Ro.Rus.	M	19.7	
A399-2	B2759-5 x A174-1		14	0			Ro.Rus.	M	19.7	
A400-6	B2759-5 x A177-9	2	3	T	332	186	Lo.Rus.	VL	24.0	
A465-8	A183-5 x B3200-4		3	3-3			Lo.Sm.	L	21.0	
A477-11	A5-11 x A180-30		10	T			Lo.Rus.	M	20.5	
A485-1	A180-34 x A163-17		9	0			Ov.Rus.	M	21.0	
A492-1	A183-8 x A139-1		7	T			Lo.Rus.	M	21.0	
A495-6	X792-88 x B595-76		1	T			Lo.Sm.	ML	24.8	
A501-13	B24-58 x A177-52		3	1-4			Ro.Rus.	VL	25.3	
Canoga		4	3	5-5	366	247	Ro.Sm.	ML	21.8	
E.Gem			90	0			Ov.Rus.	E	17.9	
Kennebec			40	4-5			Ov.Sm.	ML	20.1	
Rus.Bur.		63	60	0	205	53	Lo.Rus.	ML	20.3	
White Rose		38	66	T	356	184	Lo.Sm.	ML	18.9	

* In the tuber type column Ro. means round; Lo., long; Ov., oval; Sm., smooth; and Rus. is Russet.
** In the maturity column E is early; ME, medium early; L, late; and VL is very late.

Processing characteristics. Samples of A170-9, A180-26, A175-7, and Russet Burbank were sent to four processing companies operating in Idaho. Three of these companies were also sent a sample of Early Gems from the variety trials and a sample of Kennebecs grown in a field adjacent to the variety trials and one company was sent a sample of Menominee. Excellent reports were received from three of the companies. They tested the samples for specific gravity, taste, appearance, texture, granulation and distribution of solids. Potatoes were also processed and evaluated for cooking characteristics, frozen french fries, frozen cuts for mashed potatoes and potato chips.

Briefly, Russet Burbank rated first with every company for every type of processed product. Frozen french fries from A170-9 and A180-26 were acceptable from a quality standpoint but Russet Burbank was the only sample which produced a frozen cut which would reconstitute into an acceptable mashed potato product. The other samples were considered to be satisfactory for a frozen product which required individual piece firmness in the reconstituted product. Russet Burbank, A170-9, and possibly A180-26, were considered satisfactory for dehydrated products by one company. This same company considered Early Gem and Kennebec unsatisfactory for their individual processing needs and they stated that A175-7 was not readily adaptable for processing.

The one company which evaluated chipping quality rated them:

1. Russet Burbank
2. Kennebec
3. A175-7
4. Menominee
5. A180-26
6. Early Gem
7. A170-9

Another company found that the dehydrated product of the three numbered selections was not as good as Russet Burbank in granulation. A180-26 had some undesirable fiber but the dehydrated product had excellent texture. A170-9 and A175-7 did not have as good texture as did Russet Burbank. The dehydrated products of Russet Burbank and A170-9 were considered better in flavor and aroma than were those of A175-7 or A180-26.

Leafroll resistance test, Parma, Idaho, 1958. Sixty-eight selections were tested for leafroll and net necrosis resistance at Parma. Only two selections appeared to have no leafroll symptoms; however, a number showed only slight symptoms and had no net necrosis in their tubers. In addition a number of selections showed slight to moderate leafroll symptoms but had no net necrosis. As has occurred during previous summers several clones had leafroll symptoms early in the season but appeared to recover and produced good yields. Probably any of these selections, if their reaction is consistent, would possess enough leafroll resistance to be of value provided they also possessed desirable horticultural characteristics. The clones, their parentage, and their reaction to leafroll and net necrosis is shown in Bienz tables 3 and 4. The seed of these selections was grown in Eastern Idaho.

Eight U.S.D.A. and University of Idaho selections and ten Plant Introductions were grown from seed produced at Parma in 1957. Each of these selections had shown some resistance to leafroll during previous years. Their reaction to this disease is shown in Bienz table 5.

The reaction of the clone B2759-5 to leafroll during the past five years has been interesting. During 1954 and 1955 this clone showed no leafroll in the Parma plots. In 1956 a few stunted plants appeared early in the season and a few plants adjacent to those showed secondary symptoms later in the season. In 1957 McLean planted plots from tubers of current season, primary and "healthy" plants of this lot. He reported that seed from primary tubers produced plants dwarfed to about 12 inches which lost their lower leaves and had apical symptoms, seed from secondary tubers produced plants about 18 inches in height which also had apical symptoms and lost their lower leaves. Seed from "healthy" tubers produced apparently normal plants. In 1958 all of these lots were replanted. The reaction was about the same as in 1957 except that those from the 1956 plots having primary symptoms made fair recovery later in the season and were more vigorous in 1958 than were the plants grown from seed which came originally from plants having current season symptoms in 1956. It is interesting that plants grown from B2759-5 tubers which were healthy in 1956 have now remained free from leafroll for four years of replanting.

Bienz table 3. Potato selections showing no or only slight leafroll symptoms and no or questionable net necrosis at Parma, Idaho, 1958.

Selection	Parentage	L.R. Reaction	Net Necrosis
A371-1	B3195-3 x A115-10	None	None
A372-11	A174-1 x A115-9	None	None
A374-2	A163-4 x A115-9	V. slight	V. slight
A378-2	A115-9 x A124-116	None	V. slight
A378-7	A115-9 x A124-116	Slight	None
A380-5	A115-21 x A124-116	Slight	None
B3804-48	B2925-23 x Katahdin	Recovery	None
A321-1	White Rose x B2834-3	V. slight	V. slight
A394-1	A119-15 x A124-116	V. slight	None
B2759-5	B24-238 x 247-24	Slight symptoms on one plant	None
B3820-14	B927-3 x Katahdin	Recovery ?	None

During the past several years of testing at Parma, a few clones have exhibited what appeared to be recovery from early season leafroll symptoms. Several of the Plant Introductions showed this kind of reaction in 1957. In 1958 several of these same clones again had considerable rolling of the leaves early in the season but exhibited no dwarfing or other symptoms and appeared to be completely recovered when later observations were made. Three of the clones (PI 205623, PI 1222943, and PI 214374) which displayed the above reaction also each had one or more plants which had typical severe primary leafroll symptoms throughout the season. These dwarf yellowed stiff-leaved plants were very different from the plants of these clones which were assumed to have recovered from leafroll symptoms for the second year in a row.

Bienz table 4. Selections showing slight to moderate leafroll symptoms with no or only very slight net necrosis at Parma, Idaho, 1958.

Selection	Parentage	L.R. Reaction	Net Necrosis
A377-3	A163-4 x B177-9	Moderate	None
A411-9	A218-2 x A124-116	Slight	Sl.on 2 of 10 plants
A390-15	A179-15 x A163-28	?	V.sl.on ½ plants
A392-2	A124-116 x A163-28	Recovery	None
A36-2	A179-3 self	Moderate	None
A396-3	A119-15 x B3195-3	Moderate	None
A393-3	A116-5 x A163-28	Slight	None
A374-8	A163-4 x A115-9	Slight	V.slight

Bienz table 5. Reaction in 1958 of potato selections which showed no or very slight leafroll symptoms in 1957 and which were grown at Parma from seed harvested from the 1957 Parma leafroll plots.

Selection	Reaction 1957	Leafroll 1958	Net Necrosis 1958
B2759-5	None	None	None
B3804-48	Recovery	Recovery	V.slight
B3807-6	Recovery	Recovery*	None
B3820-14	None	None	None
B3391-16	V.slight	Slight	Severe
A321-1	None	Severe primary symptoms	--
A321-2	None	Severe primary symptoms	--
A327-1	V.slight	Severe	--
PI 1222943	Recovery	2 plants infected, others none	None
PI 215618	None	All infected	--
PI 214372	None	None	None
PI 214373	None	All infected	--
PI 214374	None	One plant severe, others slightly rolled	Slight
PI 195162	V.G. recovery	Lower leaves rolled but no dwarfing or other symptoms	None
PI 208332	None	Lower leaves rolled but no dwarfing or other symptoms	V.slight
PI 208336	None	All have moderate symptoms	--
PI 161695	V.slight	About 15% infected	None
PI 205623	V.G. recovery	2 plants have symptoms, others none	None

* Those plants listed as having recovered showed definite leafroll symptoms early in the season, but were not dwarfed and the symptoms disappeared later.

Fusarium eumartii resistance. During the past two years a tuber-rotting disease which is assumed to be caused by *Fusarium eumartii* has resulted in heavy losses in several sections of Idaho. Outbreaks of this disease have frequently been traced to seed grown at Salmon, Idaho, and is thought by Salmon growers to have come there from Montana. A small observation plot of several potato varieties and selections were planted in a field near Salmon which has been eliminated from potato production because of this disease. Three hills of Russet Burbank were planted between the end of each plot and the beginning of the next. The results are shown in Bienz table 6.

It should be emphasized that this test was of an observational nature. Only ten plants of each clone were grown and the disease in the field used was not as severe as it had been in 1957. The clones which showed tuber symptoms are undoubtedly susceptible but the ones having no symptoms may not be resistant.

Bienz table 6. Reaction of potato selections to *Fusarium eumartii* at Salmon, Idaho, 1958.

Potato selections showing medium to severe symptoms of *Fusarium eumartii*:

Kennebec (Netting effect)	Early Gem	A327-1
Great Scott	Red Beauty	A36-1
Menominee	A180-24	A183-10
Ontario	A180-26	A43-14
B24-58	A246-26	A350-3
	B2759-5	

Potato selections showing slight symptoms of *Fusarium eumartii*:

Populair	Empire	Delus
41956	Antigo	Furore

Potato selections showing no symptoms having adjacent Russet Burbanks which showed no or only slight symptoms:

Canoga	B3820-14	A175-7
Katahdin	B321-1	

Potato selections showing no symptoms having adjacent Russet Burbanks which showed medium or severe symptoms:

A170-9	Sequoia	White Rose

Gibberellic acid. Because of extensive publicity recently given to the gibberellins, many potato growers in the Northwest were led to believe that the quality of their potato crop could be improved, diseases reduced, or that potato yield could be increased by the use of this product. Three separate trials were conducted to test the effect of gibberellic acid on potatoes.

Near American Falls one grower planted 80 acres with potato seed dipped in a solution containing, in addition to his usual seedpiece treatment of 1 pound of Semesan Bel per 7½ gallons of water, three parts per million K-gibberellate. He hoped that the gibberellin treatment would allow him to plant earlier than is usually possible in this part of the country and thereby take advantage of the bonus offered by processing companies for potatoes which could be harvested earlier than is customary in this area.

This grower cooperated with the U.S.D.A. and University of Idaho and we planted three small plots within this field. In each of these was planted two 60-foot rows of seed treated with Semesan Bel only, one of seed treated with 6 ppm K-gibberellate and Semesan Bel and one with 3 ppm K-gibberellate and Semesan Bel. There was no difference in rate or percentage of plants emerging nor did there appear to be any difference in the time of onset or severity of verticillium wilt.

Plots and comparable lengths of adjacent field rows were harvested in late August and there were no significant differences in total yield, yield of U. S. No. 1's or yield of off shape (knobby, pointed and bottlenecks, etc.) tubers for any of the treatments. The only difference noted was an increase in the number of stems per hill for the treated rows. Plants grown from seed treated with 6 ppm had 2.84 stems per hill, those grown from seed treated with 3 ppm had 2.50 stems per hill and the checks had 2.13 stems per hill. These differences were significant at the .01 level. There was a tendency for the plants grown from treated seedpieces to produce a greater wieght of small tubers than did the check plants, however, these differences were not quite statistically significant. Probably a more refined experiment would show that gibberellins do increase the number of tubers set and consequently the number of small tubers.

At Rexburg a small trial of four replications was grown to test the effect of gibberellins on Verticillium wilt. In each rep two of the plots were planted with seedpieces dipped in a solution containing 10 ppm of K-gibberellate and two were planted with untreated seed. On July 23 one plot of each rep grown from treated seed and one grown from untreated seed were sprayed with a 10 ppm solution of K-gibberellate. Results are shown in Bienz table 7.

As with the American Falls trial there were no differences in total yield or yield of U. S. No. 1 potatoes; however, the plants sprayed with K-gibberellate in July had a lower verticillium index than did the checks or those grown from treated seedpieces which were not sprayed.

Previous observations have shown that verticillium wilt develops slowly on plants grown from immature seed, i. e., from seed potatoes harvested in the greenhouse or in a warmer climate during the winter or spring months. This fact might be the basis of verticillium wilt control in potatoes if a safe, convenient method for breaking dormancy could be developed. Dr. Herman Timm of the University of California supplied a small quantity of White Rose tubers which were harvested on May 15, 1958. To break their dormancy, whole tubers were dipped on May 29 in a 5 ppm K-gibberellate solution. These were planted on June 2 in a paired trial with comparable plots of untreated White Rose seed harvested in Idaho in the fall of 1957. Results are shown in Bienz table 8.

Bienz table 7. Yield and verticillium index of potatoes treated with I-gibberellate, Rexburg, 1958.

K-Gibberellate Tuber Dip	Treatment Plant spray	Total yield	Yield U.S. 1's	Verticillium Index
10 ppm	10 ppm	56.7	25.6	40
10 ppm	None	47.5	18.3	61
None	10 ppm	56.6	26.5	32
None	None	53.8	25.5	60
L.S.D. at .05 level		NS	NS	17

Bienz table 8. Yield and verticillium index of White Rose potatoes grown at Rexburg, Idaho, 1958.

Seed		Yield		Vertc.
Date harvested	Treatment	Total	U.S. No. 1's	Index
October, 1957	None	112.1	48.6	38
May, 1958	5 ppm K-Gibberellate	76.4**	50.7	8**

** Differences significant from untreated at .01 level.

Emergence was only slightly more rapid for the untreated seedpieces. The verticillium index was greatly reduced in the plots grown from immature seed; however; the total yield was higher on plots grown from regular seed than on those grown from immature seed. The yield of U. S. No. 1's was just about the same from both lots. This lack of correlation between totals and U.S.No.1's came about because of the high percentage of knobby and off-type tubers in the plots grown from regular seed.

One small observation plot comparing plants grown from gibberellin-treated Russet Burbank seed harvested in the greenhouse in May with plants grown from regular October 1957 harvested seed gave results similar to the White Rose test.

Potato breeding techniques. Frequently in a greenhouse potato breeding program, two clones between which a cross is desired fail to flower simultaneously. Several methods have been worked out for storing pollen for a period of time. We have had very good success storing pollen in an ordinary refrigerator.

When there is excess pollen of an early-blooming clone it is scraped from the anthers with a scalpel and placed in a cup made by hollowing the head of a finishing nail with a drill bit. A 3/32" bit works fairly well with a 10 penny nail or a 1/8" bit with a 16 penny nail. A piece of 2 x 4 drilled to hold a number of "nail cups" acts as the stand for these cups and a strip of "freezer tape" marked with the clone number identifies the pollen in each cup. The stand is then placed in an ordinary refrigerator.

The individual cup is taken from the refrigerator and the stigma of the flower which is to be the female is dipped into the pollen in the cup when a cross is to be made. Pollen so handled produced as high percentage seed-balls containing as many seeds after it had been stored four weeks as it did when fresh. How much longer the pollen would have remained viable is not known since four weeks was as long as was necessary to complete our crosses and the pollen was discarded after this period.

Potato selection committee. The committee rated one selection, A177-54, above Russet Burbank in tuber type. Although this selection has many excellent characteristics it was subsequently found to have yellow flesh. Two other selections which have in the past rated in vine and tuber characteristics and disease resistance were found to develop heat necrosis under certain environmental conditions commonly existing in several Russet potato growing sections. Also, the seed of several of the selections rated high during previous years was found to have considerable leafroll probably because of high aphid population during the summer of 1957. As a result, the selections which now look most promising are fairly recent products of the breeding program and will have to be evaluated for at least two years before being considered for release.

The committee went on record as favoring the establishment of a separate plot for maintaining disease-free seed of all promising selections. Plans are nearly completed for the establishment of such a plot at the Tetonia, Idaho Branch Experiment Station.

SOUTHERN PROJECT
(Louisiana Headquarters)
T. P. Dykstra

The potato improvement project is conducted in Louisiana as a cooperative program between the United States Department of Agriculture and the Department of Horticulture at Louisiana State University at Baton Rouge. Cooperation is also conducted with the Horticulture Departments of the Universities of most of the other south eastern States. The increase plots are maintained at the Plateau Agriculture Experiment Station at Crossville, Tennessee.

Performance of Seedlings in Yield Plot

Thirty-three superior seedlings and 3 check varieties were selected from the increase plots in Tennessee in 1957 to be tested in 1958 in New Roads and Port Sulphur. In New Roads, 3 replications of 33 seedlings, consisting of 30 hills each and spaced at 10-inch intervals were planted on rows 6 feet apart. This is the customary procedure in planting potatoes and other cultivated crops in this location where sugar cane is grown extensively. In Port Sulphur only 25 seedpieces of each seedling were planted at 12-inch intervals and the rows were 4 feet apart.

In cooperation with Mr. Frank Garret, 3 replications of 28 seedlings of 30 hills each were planted in Baldwin County, Alabama. This plot was planted under ideal conditions, but a 7-inch rainfall flooded the field a few days later, and was followed by additional rain. As a result about 60 percent of the seedpieces rotted. No data could be obtained except notes on the general appearance of the tubers.

The plot at Port Sulphur was planted at the regular time. Excessive rains delayed digging one month and caused some tuber rot. In New Roads, adverse weather also delayed planting one month. If a regular season had prevailed with a dry April and high temperatures practically no yield would have been obtained. Fortunately, the average temperature was not too high and excessive rains occurred during the growing season. On account of frequent drenching rains, considerable packing occurred on the heavy alluvial soil, river bottom land, on which most of the potatoes in Louisiana are grown. This caused some of the tubers to be rough and to have enlarged lenticels. In spite of these unfavorable growing conditions, several of the seedlings produced smooth, well-shaped tubers, but all were low in solids on account of the high soil moisture. The overall results obtained in this somewhat erratic growing season were still fairly satisfactory (Dykstra table 1).

Increase Plots in Crossville, Tennessee

True potato seed obtained from successful crosses is sowed in flats in the greenhouse at Baton Rouge. The young plants are transplanted to 3-inch pots and at maturity one tuber from each apparently satisfactory seedling in the progeny of the cross is saved.

Dykstra table 1. Yield in bushels of U. S. No. 1 potatoes per acre in plots at New Roads and in Port Sulphur, Louisiana.

Accession Number	Parentage	New Roads	Port Sulphur	Ave. Solids	Segregating For	Tuber Appearance
		Bu.	Bu.	Pct.		
LaSoda		384	348	16.0		Good sh. & dolor, red
TL 1859	Pontiac x 96-56	345	369	17.4	R, Sc, Bl.	Oblong, pink
TL 6265	TL 2778 x B 2368-4	336-	268	18.0	R, Sc.	Good shape, blocky red
TL 3674	B 446-54 x Teton	326	239	15.8	Wh, Bl.	Smooth, good sh, wh.
TL 6279	TL 1859 selfed	312	319	16.2	R, Sc, Bl.	Smooth, oblong br. red.
TL 6078	Triumph x B 2368-4	303	348	16.6	R, Sc.	Smooth, blocky good color red
TL 6077	" "	278	305	17.6	R, Sc.	Blocky, smooth color, lt.red
TL 6609	B 2368-4 x B 3131-8	259	174	18.7	R, Sc, Bl.	Good sh. & color
TL 6226	TL 2778 x B 2368-4	235	275	18.0	R, Sc.	Very good shape blocky, good color
TL 6521	B 2368-4 x B 2997-9	231	239	17.7	R, Sc.	Vig. tubers rough
TL 6519	B 2368-4 x B 2997-9	226	305	16.6	R, Sc.	Oblong, good sh. & color
TL 6003	B 874-35 x B 2997-9	225	109	17.7	Wh. Sc. Bl	Very good sh. smooth wh.
TL 6580	B 3131-21 x B 2368-4	216	123	16.0	R, Sc. Bl	Good sh. color & size
TL 6603	B 2368-4 x B 3131-8	211	232	17.7	R, Sc. Bl	Small, good color and sh.
TL 6536	B 2368-4 x B 2997-9	197	232	17.8	R, Sc. Bl.	Very good sh. smooth red
Triumph		197	232	16.6		Good sh. lt. red
Sebago		196	234	15.3		Good sh. smooth wh.
B 2368-4		187	348	18.0	R, Sc.	Rough, deep eyes
TL 6563	B 3131-21 x B 2368-4	182	268	17.0	R, Sc, Bl.	" too small
TL 6590	B 3114-12 x B 2997-9	182	319	17.0	R, Sc, Bl.	Good sh. & size red
TL 6088	LaSoda x B 2368-4	182	225	16.4	R, Sc.	Good sh. Smooth red
TL 6089	LaSoda x B 2368-4	173	217	16.1	R, Sc.	Good sh. blocky smooth red
TL 6875	B 2368-4 x B 3131-8	168	217	17.4	R, Sc. Bl.	Pink
TL 6264	TL 2778 x B 2368-4	163	319	17.4	R, Sc.	Blocky, lt. red
TL 6095	LaSoda x B 2368-4	154		16.0	R, Sc.	Small, but good sh. & color
TL 6017	B 2368-4 selfed	154	305	17.1	R, Sc.	Rough

continued

Dykstra table 1, continued.

TL 6156	C 479 x B 2875-8 x Ia 947-1a	154		18.2	R,Sc,Bl.	Good sh.blocky heavy set
TL 6509	Teton x B 3139-24	153	168	16.4	Wh.Sc.Bl.	Very smooth,small white
TL 6112	Minn. 43-46-6 x Ia 947-1a	139	87	17.7	R,Sc,Bl.	Light red
TL 6219	TL 2778 x B 2368-4	134	109	17.1	R,Sc,Bl.	Smooth,very good sh. and color
TL 6097	B 2874-4 x Ia 947-1a	130		17.0	R,Sc,Bl.	Good sh,color,Satis.
TL 6181	C 210 B 874-24 x Ia 947-1a	129	123	17.5	R,Sc,Bl.	Small, irregular
TL 6225	TL 2778 x B 2368-4	125	181	18.8	R,Sc.	Good sh. and color
TL 6150	C 210 B 874-24 x Ia 947-1a	81	109	18.8	R,Sc,Bl.	Too small
TL 6448	B 3006-22 x B 2968-31	77	60	16.0	Wh,Sc,Bl.	Good sh,oblong smooth wh.
TL 6423	TL 1859 x B 2336-2	348		16.6	R,Sc,Bl.	Too rough,deep eyes
	LSD .05	47				
	LSD .01	61				

In the spring these tubers and additional tubers from the greenhouse crop from Beltsville, Maryland, sent to us by R. V. Akeley are planted in an isolated plot surrounded by woods at the Cumberland Plateau Agricultural Experiment Station at Crossville, Tennessee. In the fall selections of these seedlings are made on the basis of tuber appearance and yield. Reselections are made from seedlings selected in previous years which had been replanted in this plot. The selected lines will be replanted in the same area the following year. Only seedlings that came originally from true potato seed and have never been exposed to infection are grown in this area. Every few years the increase plot is changed to a newly cleared piece of land in the same isolated area. During the last 10 years we have failed to find a single virus-infected plant in this plot.

In the other plots at the Station used for making crosses and for the maintenance of some older seedlings and named varieties, some virus diseases are generally evident and are kept at a minimum by roguing.

The 1958 growing season in Tennessee was ideal for potatoes resulting in excellent seedset, tuber shape and high yields.

Desirable seedlings were selected to be tested for yield and adaptation in other southern States in 1959. Some of the more advanced seedlings that looked exceptionally promising, based on several years of testing, were selected to be increased in some of the northern seed-producing States. Before a variety can be grown commercially in the South, northern-grown seed has to be available. It is necessary to demonstrate that a variety adapted to the South, can also be grown profitably for seed production in the North (Dykstra table 2).

Dykstra table 2. Seedling varieties sent to cooperators.

State	Cooperator	Purpose	Number of Varieties
Alabama	F. Garrett	Yield plot	34
Hastings, Florida	E. N. McCubbin	Yield plot	15
Homestead, Florida	J. C. Noonan	Yield plot	13
Louisiana	Julian Miller	Yield plot	41
Louisiana		Scab resistance	62
Louisiana		Blight resistance	54
Mississippi	W. S. Anderson	Yield plot	12
North Carolina	F. Haynes	Yield plot	7
Tennessee	T. R. Gilmore	Yield plot	16
Texas	P. Leeper	Yield plot	15
Maine	Robert Akeley	Increase	15
Nebraska	W. Trank	Increase	9
South Dakota	Julian Miller	Increase	8
Wisconsin	M. Raminsky	Increase	10

Scab Resistance Test

Scab continues to be a serious disease in some sections of the South. Seed treatment has proven to be totally inadequate since the causal organism of this disease infests the soil and persists in it. The only solution to the problem is scab resistance.

Complete immunity seems to be difficult if not impossible to accomplish. The best one can hope for is to develop varieties on which pustules will appear only as small shallow lesions. Any infected variety that develops exclusively No. 1 or No. 2 pustules when exposed to infection has a desirable type of resistance.

Our scab resistance project is considered more important for the southern region than the one on blight resistance.

A total of 114 seedlings, progenies from scab-resistant parents were tested for scab resistance. Four seedpieces of each of these seedlings were planted in 5-inch-flower pots filled with scab infested vermiculite prepared according to the method of Dykstra[1/]. These were grown in a lath house of the Louisiana Agricultural Experiment Station at Baton Rouge until the plants were mature. Scab readings were taken on type of pustules developed and surface area covered (Dykstra table 3).

1/ Dykstra, T. 1956. A new method of screening first year potato seedlings for scab resistance. Phytopathology 46: 57-58.

Dykstra table 3. Reactions of seedlings to scab infection.

Acc. No.[1]	Parentage	Type[2]	Area[3]
5263	B 2326-4 x B 2368-4	1	1
5347	B 922-24 x B 929-32	1	1
6003	B 874-35 x B 2997-9	3	1
6006	B 355-24 x 96-56	3	3
6010	B 2368-4 selfed	3	1
6017	"	3	3
6043	B 355-24 x B 3160-12	2	2
6044	"	1	tr.
6052	B 606-37 x B 2968-31	3	1
6059	" x Saranac	3	3
6076	Triumph x B 2368-4	1	1
6077	"	1	1
6078	"	2	3
6080	"	3	4
6082	B 2067-52 x B 2968-31	3	3
6087	B 381-2 x B 2368-4	1	1
6088	LaSoda x "	2	3
6089	"	3	3
6091	"	1	3
6094	B 2874-4 x Ia 947-1a	1	1
6095	"	3	2
6097	"	3	1
6102	Minn.43-46-6 x Ia947-10	1	1
6106	"	1	2
6107	"	3	1
6113	"	1	1
6123	Ia 947-10 x B 962-32	2	3
6136	B 2875-8 x Ia 947-10	1	1
6137	"	2	1
6142	"	3	1
6146	B 2993-4 x "	2	1
6153	"	2	1
6156	"	2	2
6161	"	2	4
6179	B 874-24 x Ia 947-10	2	2
6180	"	3	3
6182	"	2	2
6191	"	3	3
6193	"	1	1
6196	"	3	1
6198	"	1	tr.
6199	"	1	1
6211	Ia 947-10 selfed	1	tr.
6219	TL 2778 x B 2368-4	1	1
6267	TL 2778 x B 2368-4	3	2
6279	TL 1859 selfed	2	2
6400	B 2876-1 x TL 2778	3	2
6401	"	3	2
6408	B 2131 x TL 2336	2	3
6420	TL 1859 x "	3	2
6434	B 3006-22 x B 2968-31	3	3
6440	"	3	3
6448	"	1	1
6467	B 2875-8 x B 2903-17	2	1
6489	Ia1077-W-s x Ia947-10	1	2
6492	Teton x B 3139-24	3	3
6497	"	3	2
6509	"	2	2
6520	B 2368-4 x B 2997-9	3	3
6521	"	2	1
6522	"	1	1
6530	"	2	1
6531	"	2	3
6532	"	2	2
6534	"	3	3
6536	"	2	2
6538	"	3	3
6539	"	3	3
6543	"	2	3
6544	"	2	2
6555	"	3	2
6578	B 3131-8 x B 2368-4	3	3
6580	"	3	3
6581	"	3	3
6585	B 3114-12 x B 2997-9	3	1
6586	"	3	3
6589	"	1	1
6590	"	3	2
6593	"	1	1
6600	Progress x B 2368-4	3	4
6601	"	3	3
6602	"	3	4
6605	B 2368-4 x B 3131-8	1	1
6609	"	3	2
6614	"	3	3
6623	Pontiac x B 2368-4	3	2
6664	B 76-23 x B 2998-1	1	1
6822	B 2368-4 x B 2331-5	2	1

- continued -

Dykstra table 3, continued.

6222	TL 2778 x B 2368-4	1	1
6225	"	3	1
6226	"	2	3
6231	TL 1345 x B 2997-9	1	1
6233	"	3	3
6262	TL 2778 x B 2368-4	1	1
6263	"	1	1
6265	"	3	2
6825	B 2368-4 x B 2331-5	2	2
6831	"	1	1
6862	B 2910-1 x B 3131-8	1	1
6924	B 3203-6 x LaSoda	1	1
6937	B 792-88 x B 962-32	2	1
6954	Ia1043-2xIa1077W28-5	2	2
6955	Ac 25668 x Ia 874-2	1	1
LaSoda		3	3

1/ TL (Tennessee-Louisiana selections) omitted.

2/ Type: 1, small, superficial; 2, large, but still superficial; and 3, large, rough pustules.

3/ T, less than 1 percent; 1, 1 to 20 percent; 2, 21 to 40 percent; 3, 41 to 60 percent; and 4, 61 to 80 percent.

Rating was given on basis of most severe type of lesion found and the largest area covered on any one tuber from each lot of seedlings tested.

In testing various methods, we have found scab infested vermiculite to be far superior to other mediums in testing for resistance. It has given consistently satisfactory results regardless of climatic conditions. Using naturally infested soils have given inconsistent and unsatisfactory results. There are some indications that aeration plays an important part in the development of scab infection. Most potatoes grown in Louisiana are planted in river bottom land, consisting of heavy alluvial soil. Heavy rains over an extensive period causes considerable packing in these soils and results in reduced aeration and less scab.

In scab-infested vermiculite there is never any packing, and no interference with aeration. Regardless of prevailing climatic conditions, scab infection in vermiculite occurs consistently.

When scab-infested vermiculite is applied to the planting furrow and mixed with the heavy soil, irregular infection with scab also occurs.

Late Blight Resistance Test

In some of the southern States late blight is a common occurrence. This is especially true in sections of Alabama and Florida, where the growers spray at weekly intervals to control the disease. In other southern States the disease is sporadic in occurrence due to climatic conditions. In these States the disease is potentially important, since not many of the growers spray regularly. When a late blight epidemic occurs, the losses are often severe. For these areas, blight resistant varieties are especially needed.

To test seedlings for blight resistance four seedpieces of each seedling from blight-resistant parents are planted in 5-inch pots. The same number of seedpieces of susceptible checks and known resistant varieties are interspersed among them at suitable intervals in an airconditioned moist chamber in the greenhouse at Baton Rouge.

After the plants are about 3 inches high they are sprayed with a water suspension of conidiospores of Phytophthora infestans, strain A. The inoculations are repeated 3 or 4 times at 3-day intervals, to induce uniform infection.

Every precaution is taken to avoid infection of potato plants outside the moist chamber. For this reason the testing is conducted during the season when no potatoes are grown outdoors. A high percentage of our selections are resistant to the late blight organism (Dykstra table 4).

Dykstra table 4. Reaction of seedlings to late blight in 1957.

Acc. No. 1/	Parentage	Classes 2/	Acc. No. 1/	Parentage	Classes 2/
2988	B 96-56 x Sebago	0	6857	2910-1 x B 3131-8	0
3633	Ia 961 B 55 T	0	6862	"	0
3655	Ia 982 B 110 T	0	6865	"	0
3674	B 446-54 x Teton	0	6870	"	2
3769	Kennebec x B 522-33	2	6874	B 2368-4 x B 3131-8	0
4112	Kennebec selfed	0	6881	B 56-10 x B 3139-24	no pl.
4814	TL 870 x B 929-16	0	6886	"	2
4817	"	0	6894	2910-1 x B 3131-8	1
6003	B 874-35 x B 2997-9	0	6896	"	0
6043	B 355-24 x B 3160-12	0	6898	"	2
6112	Minn. 43-46-6 x Ia 947-10	0	6900	"	0
6150	B 2993-4 x Ia 947-10	1	6907	B 2368-4 x B 3131-8	2
6265	TL 2778 x B 2368-4	2	6910	"	0
6279	TL 1859 selfed	0	6916	"	1
6423	" x TL 2336	2	6917	"	0
6448	B 2998-1 x B 2997-9	2	6928	LaSoda x B 3131-8	0
6457	B 2162-18 x B 2131-3	0	6932	B 1276-185 x B 773-21	2
6492	Teton x B 3139-24	1	6937	B 792-88 x B 962-32	0
6513	"	0	6945	B 2875-8 x B 6316	1
6515	"	0	6949	B 927-3 x B 922-6	2
6563	B 3131-21 x B 2368-4	2	6950	"	2
6578	"	2	6954	Ia1043-2 x Ia1077-W-28-5	0
6590	B 3114-12 x B 2997-9	0	Cherokee	12 plants	0
6603	B 2368-4 x B 3131-8	2	Red LaSoda	"	2
6609	"	0	Sebago	8 plants	1
6826	" x B 2331-5	1			

1/ See footnote 1 in Dykstra table 3.

2/ Classes: 0, no lesions detected; 1, occasional lesion; 2, more than ½ of the leaves blighted.

U. S. - COLORADO POTATO FIELD STATION (GREELEY, COLORADO)

John G. McLean, Harold A. Chapman, and L. A. Schaal

Potato plantings at Greeley were made on 4-year old alfalfa land which received 20 tons of manure per acre previous to spring plowing. No commercial fertilizer was added. The fields were furrow irrigated at approximately weekly intervals. A DDT-Malathion Diathane spray was applied each 2 weeks during the growing season.

Cultural trials were conducted on the Greeley Station by Dr. Harold A. Chapman, Colorado State University, Fort Collins, Colorado. Insect control tests were made by the Entomology Department of C.S.U. under the direction of Leslie B. Daniels.

Variety Yield test. Eight Colorado Seedlings and 8 numbered varieties were planted at 2 dates; May 5, and May 21. Five replications were used at each planting date. Of the 6 highest yielding varieties (McLean table 1), 3 were Colorado Seedlings; C.S. 12240, C.S. 13178 and C.S. 13153. Both C. S. 13178 and C. S. 13153 are moderately scab-resistant, while C.S. 12240 is highly resistant. The 3 high-yielding standard varieties, Red LaSoda, Pontiac and Katahdin are scab susceptible. Relatively high specific gravity and total solids were found with the 3 Colorado Seedlings. Both Red LaSoda and Pontiac were low, while Katahdin had both yield and quality.

The percentages of U. S. No. 1 and the defects for each variety are shown in McLean table 2. Over-size tubers, weighing more than 1 pound were included with the No. 1 potatoes for the calculation. Second-growth and growth cracking were the major defects for Early Gem, C. S. 12240 and Red LaSoda. Kennebec and Katahdin were susceptible to greening in the field. The lowest total percent of defects was shown by Colorado Seedlings 11889, 11888, and 13178. Both C. S. 11888 and 11889 are early maturing and have shown considerable promise in the early potato area. C. S. 11889 was outstanding in demonstration tests conducted by Dr. Frutchey. C. S. 12240 is very promising because of its yield, quality and high scab resistance. C. S. 13178 has been released under the name Navajo.

Disease Spread and Control. Seedling lines which had been grown on the Greeley Station were badly contaminated with leafroll and other virus diseases. Lines which had been grown for one or more years averaged 17 to 25 percent healthy. A sample of the indexing results revealed the diseases as follows: leafroll 28%, mosaic 14%, Y virus 8%, spindle tuber 3%, yellows, necrosis, and weak 28%. After indexing in the greenhouse, there were only 170 lines in which disease-free tubers could be found for planting in the field. One line, however, C. S. 16055 appeared to be entirely free of disease symptoms both in the greenhouse and field although it had been grown on the station for 3 previous seasons.

The use of the term "yellows" in this report refers to a disease which is locally called aster yellows but the disease syndrome found here closely fits the description of "bunch top" as reported by Mac Leod (Am. Potato Jour. 31: 119-128, 1954). Leaves of the affected plants are linear, dark green, heavy appearing, with undeveloped yellowed margins. The plants are shortened, weakened, and open in appearance. Current season symptoms include

very heavy, dark necrosis at the stem end and a bitter taste to the cooked tuber. Germination of infected tubers is very low and the few sprouts that develop generally result in weak or hair-sprout type plants. A few vigorous plants were found in the greenhouse, however, which showed leaf and vine symptoms of the disease.

McLean table 1. Yield and quality of varieties and seedlings from 2 planting dates at Greeley, Colorado, 1958.

Variety	Total Yield Per Acre Early Cwt.	Total Yield Per Acre Late Cwt.	Mean Cwt.	U.S. No. 1 Per Acre Early Cwt.	U.S. No. 1 Per Acre Late Cwt.	Mean Cwt.	U.S. No.1 Pct.	Spec. Gravity Ave.	Total Solids Pct.
CS 13950	229.7	268.0	248.9	192.2	227.7	210.0	.84	1.081	19.9
CS 13153	330.2	326.1	328.2	284.9	277.9	281.4	.86	1.090	21.7
CS 12240	352.8	357.2	354.9	278.5	294.2	286.3	.81	1.085	20.7
CS 11888	196.9	245.1	221.0	182.1	229.4	205.9	.93	1.078	19.5
CS 13178	295.3	327.9	311.6	270.9	296.8	284.0	.91	1.084	20.5
CS 13222	273.0	301.4	287.2	244.2	268.6	256.4	.89	1.084	20.5
CS 13928	266.6	295.9	281.4	239.3	259.3	249.5	.89	1.087	21.0
Katahdin	344.7	362.1	353.4	300.9	322.1	311.6	.88	1.082	20.2
Rus Rural	223.3	218.7	221.0	192.5	200.7	196.6	.89	1.090	21.8
Kennebec	282.8	294.8	288.9	188.8	209.1	198.9	.69	1.083	20.4
Pontiac	350.2	357.5	354.0	301.1	313.9	307.5	.87	1.073	18.3
Red LaSoda	392.9	349.1	371.1	313.1	302.6	307.8	.83	1.076	18.9
Cobbler	279.1	289.2	284.3	221.0	245.1	233.2	.82	1.071	17.8
Dozoc	115.3	178.3	146.9	95.0	151.9	123.4	.84	1.067	17.0
Early Gem	237.5	296.8	267.2	126.3	171.9	149.3	.56	1.061	15.7
CS 13951	249.2			190.2			.76	1.090	21.8
CS 11889		147.2			141.7		.96	1.081	19.9
L.S.D. .05	21.8	21.8	21.8	NS	NS	33.1		.0032	
.01	29.0	29.0	29.0	NS	NS	43.9		.0070	
Average Dates	277.9	298.0		228.8	251.5				
Dates L.S.D. .05		7.8			12.2				
.01		10.5			16.0				

McLean table 2. Percentage of U. S. No. 1 grade and major defects of seedlings and varieties grown at Greeley, Colorado, 1958.

Variety	U. S. No. 1 Tubers	Second-growth and growth crack	Green	Small	Oversize	Scab
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
CS 13950	84	2.2	5.0	7.0		1.2
CS 13153	86	1.6	5.8	6.0	T	T
CS 12240	81	9.2	2.1	7.5		.3
CS 11888	93	1.3	1.1	4.0		T
CS 13178	91	1.9	3.3	2.5	4.3	1.0
CS 13222	89	.6	2.4	7.4	T	T
CS 13928	89	1.3	3.7	6.1		T
Katahdin	88	1.9	6.7	3.1	7.1	T
Russet Rural	89	3.6	1.1	5.9	1.5	T
Kennebec	69	9.5	11.0	7.1	1.8	T
Pontiac	87	8.1	1.4	3.2	7.4	.5
Red LaSoda	83	12.0	2.0	2.3	8.7	T
Cobbler	82	7.8	3.5	3.5	5.2	.9
Dozoc	84	4.0	.6	9.0	.1	1.1
Early Gem	56	40.8	.5	2.3		
CS 13951	76	7.2	1.0	14.0		1.1
CS 11889	96	.2	1.5	1.8		T

One side of the potato disease plot was bordered by carrots which were 80% infected with aster yellows. The incidence of yellows and necrosis in potatoes was not higher on this side of the field but was generally distributed around the introduced infection in the disease plot.

Five diseases; leafroll, mosaic, yellows, spindle tuber and Y were selected from the greenhouse indexing. These were planted in a triplicated latin square in the field on May 27. Each disease plot was separated in the row by 20 hills of Waseca, and the diseased rows were separated from each other by a row each of Waseca and C.S. 12240.

The plot was designed to test early spray with a systemic insecticide, early removal of diseased plants and early harvest on spread of the 5 diseases. The spray treatments were: 1) DDT and Malathion, 2) DDT, Malathion and Systox, 3) control. This differential spray was applied June 23 when all plants had emerged. One row of diseased plants was removed from each plot a few days later. The Waseca variety was dead before September 1, while C.S. 12240 did not mature until 3 weeks later. The difference in varietal maturity replaced the early harvest originally planned for the test.

Because of the possibility of invasion by potato psyllid in the control plot, the entire plot was sprayed with DDT and Malathion on July 7, 15, and 21, and August 4 and 18.

A reduction of current-season disease symptoms by August 15 was found when Systox was used in the early spray. This is illustrated on the Waseca Variety in McLean table 3. As a result of late current-season-leafroll spread, however, the C.S. 12240 rows were about 35% infected by September 20.

The yellows disease as measured by 10-tuber samples of each 20 adjacent test-hills throughout the plot was chiefly centered around the point of infection as shown in McLean table 4. Forty-one percent of the infected plants were within 3 feet of the source while only 19% were more than 12 feet away. This would seem to indicate a non-persistent virus and a vector that does not prefer potatoes or moves short distances.

McLean table 3. Current-season disease symptoms on Waseca variety in disease test. Greeley, Colorado, 1958.

Vine symptoms of disease in adjacent plots	Control	Malathon, D.D.T.	Malathon, D.D.T., Systox	Total in adjacent plots	Total Symptoms
	No.	No.	No.	No.	No.
Leafroll	6	6	2	14	61
Mosaic	3	7	0	10	12
Yellows	3	2	2	7	8
Spindle Tuber	8	2	2	12	12
Total in adjacent plots	20	17	6	43	
Total symptoms	50	33	10		93

McLean table 4. Number and percentages of yellows necrosis tubers at different distances from source of infection.

Perimeter distance from source	Necrosis in tubers		
	Number	Percent	Total Percent
3 feet	32	41	
6 feet	13	17	58
9 feet	2	3	60
12 feet	12	15	76
Over 12 feet	19	24	
Total	78		100

Samples of 10 tubers each were taken from 20 hills in both Waseca and C.S. 12240 for a total of 1500 tubers. These will be indexed in the field in 2-hill units in 1959 to determine the extent of disease spread in 1958. Similar samples were saved from the insect control test for evaluation of disease control along with insect control. These samples will be field indexed in 1959.

Date of harvest. Kennebec, Russet Rural and C.S. 13178 varieties of potatoes were planted on May 1 in a replicated experiment. They were harvested on 3 widely spaced dates: August 29, September 19, and October 8. Each plot was 2 rows wide and 50 feet long. The results are shown in Chapman table 1.

Highly significant differences were recorded between varieties and harvest dates. Kennebec yielded highest on the early harvest date but yielded least of the 3 varieties at the late harvest. Yields of Kennebec and Russet Rural were less on the last harvest than on the September 19 harvest date. C.S. 13178, however, produced a large increase in total yield and yield of U. S. No. 1 tubers between September 19 and October 8.

It would seem that harvesting potatoes near the 20th of September and before October 1 will result in maximum yields with Kennebec and Russet Rural. Considerable skinning of tubers occurred at the early harvest.

Kennebec was low at all dates in percentage and amount of U. S. No. 1 potatoes. The major defect was bottlenecked tubers but other off types also occurred. While the percentage of U. S. No. 1 potatoes was about the same with the other 2 varieties, C. S. 13178 would definitely make the more attractive pack and greater yield of marketable tubers.

Chapman table 1. Total yield, U. S. No. 1, and discards from 3 harvest dates.

		Kennebec	Russet Rural	CS 13178	Average
Total yield Cwt.lA:					
Harvested	Aug. 29	270.8	254.8	244.3	256.6
	Sept. 19	310.3	318.0	311.9	313.4
	Oct. 8	285.1	309.7	361.5	318.8
Average		288.7	294.1	305.9	
LSD .05	Dates or Varieties 39.0				
Yield U.S. No.1 Cwt.lA:					
Harvested	Aug. 29	176.8	191.6	216.9	195.1
	Sept. 19	175.0	259.2	267.6	233.9
	Oct. 8	175.9	243.4	301.5	240.3
Average		175.9	231.4	262.0	
LSD .05	Dates or Varieties 32.6				

Chapman table 1. (Continued)

	Kennebec	Russet Rural	CS 13178	Average
Percent discarded:				
Harvested Aug. 29	35.7	24.8	11.2	23.9
Sept. 19	43.6	18.5	14.2	25.4
Oct. 8	38.3	21.4	16.6	25.4
Average	39.2	21.6	14.0	

Dates of Planting. Kennebec, Russet Rural and C.S. 13178 varieties of potatoes were planted on May 1, May 20, and June 5. Each plot was 2 rows wide by 50 feet long and replicated 3 times. All plots were harvested October 8. The great differences between dates and the low yields from the June 5 planting (Chapman table 2), was primarily due to the conditions at planting time. The soil had become packed by rains, then dried out and hard, and weeds had become a problem. In addition, the seed was in poor condition by June 5 and poor stands and weak plants resulted.

C.S. 13178 was consistently lower in yield than Kennebec or Russet Rural which probably accounts for the significant difference in variety yield. Kennebec yielded highest but the difference between it and Russet Rural is probably not statistically significant. Highly significant differences in yield for replications should also be noted.

Kennebec produced a large number of off-type tubers in this test. Many of them tended toward bottleneck types, indicating perhaps unfavorable tuber forming conditions early in the season. This condition was apparent on all harvest dates but percentage-wise became less late in the season. Russet Rural and 13178 produced about the same percentage of U.S. No. 1 potatoes, but 13178 made a far more attractive pack.

Seed Piece Size and Spacing. Certified seed of Russet Rural and Pontiac was carefully selected for tubers weighing 150 to 210 grams and for tubers weighing 70 to 100 grams. The larger tubers were cut into halves and quarters to give 0.2 lb. and 0.1 lb. cut seed and the smaller size tubers selected were planted whole. The seed was planted at 2 spacings in the row, 8" and 16". The experiment was planted on May 1 and harvested September 19. The plots were 2 rows wide and 50 feet long. The results are shown in Chapman table 3.

Chapman table 2. Total yield, U. S. No. 1 and discards from 3 planting dates.

		Kennebec	Russet Rural	CS 13178	Average
Total yield Cwt. 1A:					
Planted	May 1	364.4	304.2	271.6	313.4
"	May 20	318.7	313.8	289.4	307.3
	June 5	116.3	109.8	84.8	103.6
Average		266.5	242.6	215.3	
LSD 05	Dates or varieties		46.9		
Yield U.S. 1 Cwt. 1A:					
Planted	May 1	179.3	231.5	201.0	203.9
	May 20	174.6	255.4	232.4	220.8
	June 5	76.2	77.8	63.2	72.4
Average		143.4	188.2	165.5	
LSD 05	Dates or varieties	33.7			
Percent discarded:					
Planted	May 1	50.8	23.9	26.0	33.6
	May 20	45.2	18.6	19.7	27.8
	June 5	34.5	29.1	25.5	29.7
Average		43.5	23.9	23.7	

Chapman table 3. Yield and quality of 2 varieties due to seed-piece size and spacing.

Variety, spacing, and seed size	Total yield Per acre	U.S. No.1 Per acre		Throw-outs	Oversize	B Size
	Cwt.	Cwt.	Pct.	Pct.	Pct.	Pct.
Russet Rural:						
Wide space						
-0.1 lb. cut	229.5	156.6	68.2	17.3	12.0	2.5
-0.2 lb. cut	313.5	243.6	77.7	11.4	6.5	4.4
-0.2 lb. whole	318.9	231.5	72.6	15.1	9.1	3.2
Narrow space						
-0.1 lb. cut	274.0	205.8	75.1	13.7	7.0	4.2
-0.2 lb. cut	283.4	235.8	83.2	8.9	3.6	4.3
-0.2 lb. whole	315.3	250.0	79.3	9.3	3.8	7.6
Pontiac:						
Wide Space						
-0.1 lb. cut	285.7	170.0	59.6	14.3	23.4	2.7
-0.2 lb. cut	352.4	200.9	57.0	17.5	22.6	2.9
-0.2 lb. whole	384.0	203.1	52.9	22.7	21.6	2.8
Narrow Space						
-0.1 lb. cut	331.7	227.9	68.7	14.7	13.2	3.4
-0.2 lb. cut	363.5	242.8	66.8	14.6	15.9	2.7
-0.2 lb. whole	388.2	271.4	69.9	18.2	8.7	3.2

The Analysis of Variance shows a highly significant difference between treatments, which when further broken down indicated a highly significant difference between the two varieties and between the different seed sizes. It appears that as long as seed pieces weighing 0.2 lb. were used, the yield was about the same regardless of spacing. With small seed pieces (0.1 lb.) the closer spacing was decidedly superior in yield. The high seeding rate (38.6 Cwt./ acre) gave distinctly less net yield per acre than the same seed-piece sizes planted at the wide spacing.

The percentage of U.S. No. 1 potatoes was higher for Russet Rural than for Pontiac in all treatments. The number of over-size potatoes was always greater at the wide spacing particularly with Pontiac.

In addition there is some indication that smaller sizes and cut-seed also tended to increase the amount of over-sized tubers. The throw-outs, primarily rough, knobby, or green tubers; were always greater with the wide spacing. When one considers both the quantity of seed planted and the yield of U.S. No. 1 potatoes the narrow spacing had a distinct advantage in this test with both varieties.

ALASKA

C. H. Dearborn

Field testing of potato seedlings originating from crosses made outside Alaska has shown that two new red-skinned varieties are better adapted here than any reds previously tested.

Wisconsin's Red Beauty is the outstanding red-skinned potato for eye appeal. It is only average in yielding ability and cooking quality but should meet any competitive red that may be shipped in from other States.

North Dakota's Norland is an attractive red-skinned potato, yielding 20 to 30 per cent more U. S. No. 1 tubers in 1958 than any other red variety. Cooking tests have not been extensive enough to permit an accurate evaluation.

In screening for scab resistance at Fairbanks on land so heavily infested with scab that marketable Green Mountain cannot be grown, varieties Ontario, Seneca, Cayuga, and Wisconsin AG 56-55 showed high resistance. The latter variety merits further consideration because of its yield and desirable tuber characteristics when grown in the Fairbanks environment. Dry-matter content is higher than Ontario although productivity is significantly less. After-cooking darkening, a serious weakness in some varieties including Ontario, has not been determined for Wisconsin AG 56-55. A seedling from a cross of X 528-170 x B 929-32 also shows high scab resistance, high dry matter but low yielding ability.

In connection with variety testing at Fairbanks it was noted in 1957 that certain seedlings and named varieties exhibited a wilted condition at the stolon-end of tubers. This was first observed after a three months period in common storage. No macroscopic internal zoning was associated with the wilting. In 1958 Green Mountain tubers showed this characteristic wilting at the stolon-end. Since the parent stock at Matanuska has not shown this condition, it appears that it is associated with the Fairbanks environment.

Another abnormality of some potato seedlings that is associated with growing condition is the occurrence of brown sunken lesions on the shoulders of the stolon-end of tubers. Within a variety, the higher the dry-matter content the higher the incidence of lesions. In the northwestern States a similar defect of tubers is termed black or bluish spot.

Varieties Green Mountain and a selection from Sequoia x 178.42-1-43 have been most susceptible, although seedlings with Cobbler or X 792-94 as a parent were affected. Care has been exercised in hybridizing to avoid combinations of two susceptibles. A seedling of Knik x Earlaine shows promise of being resistant to brown sunken lesions but is low in dry matter.

In Alaska nutritional studies have shown that higher levels of soil potash alleviate but do not eliminate brown sunken lesions.

Screening for frost resistance is continuing with some material selected from seeds obtained from Iowa. In this work emphasis is placed on frost resistance during or following the grand period of growth of the plant. Two tuber-bearing selections are under study.

Since the last reporting from Alaska a new variety has been released from the breeding program and accepted by Crop Improvement Association members. This variety has been tested under code Alaska 43-47-10-50. Its description will be written in the near future. Yield has been sacrificed for high quality to the extent that it is considered mainly for home garden or special trade purpose.

CALIFORNIA

Glen N. Davis

Potato test plots were planted at Shafter and Tulelake in 1958. At Shafter 2 plots were grown: (1) a varietal yield test and a (2) plot to test for scab resistance. At Tulelake a single yield test plot was grown.

At Shafter for the varietal yield test, 7 varieties were replicated 10 times and 9 other varieties or numbered seedlings were replicated from 1 to 3 times depending on the amount of seed available. The variety, White Rose, was used as a check. The results are given in California table 1.

In the scab test plot 9 lines were planted in 10-hill lots and approximately 500 first generation seedlings in single hill lots. Data from the 9 10-hill plantings are presented in California table 2.

At Tulelake 6 varieties were replicated 5 times and 3 numbered seedlings were planted in single 25-hill replicates. Specific gravity was not obtained on the Tulelake planting. Results are given in California table 3.

California table 1. Potato Variety Yield Test, Shafter, California, 1958.

	REPLICATION											
Kind	1	2	3	4	5	6	7	8	9	10	Mean	Solids
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Pct.
Merrimack	34.0	27.5	32.0	27.0	38.0	27.0	26.0	27.5	33.0	30.0	30.2	20.2
Keswick	38.5	38.0	33.5	31.0	35.5	22.0	18.0	26.5	29.5	28.5	30.1	19.4
Saco	48.0	54.0	49.5	46.5	53.0	52.0	48.0	51.5	51.0	37.5	49.1	19.7
Tawa	39.5	38.5	26.5	42.5	14.0	27.0	38.0	47.0	38.0	38.5	34.9	19.2
Osage*	26.0	31.0	29.5	14.0							25.1	20.4
Pungo	42.0	34.5	17.5	38.5	35.0	32.0	38.5	42.5	47.5	37.5	36.5	19.7
Plymouth	28.5	27.5	30.0	35.0	23.0	34.5	28.5	30.0	33.5	33.0	30.3	18.4
White Rose	37.5	37.0	19.0	48.5	36.0	38.0	34.0	45.0	36.0	35.0	36.6	19.4
B 2874-4*	43.0	37.5	15.0								31.8	18.9
B 3140-36*	15.5	21.5	28.5								21.8	18.4
B 3319-30*	39.0	35.0	31.0								35.0	19.2
B 3428-20*	32.0	28.5									30.2	18.7
B 3428-41*	31.0	26.5	33.0								30.1	19.9
B 3457-2*	31.0										31.0	20.7
B 180-25*	34.0	37.0									35.5	18.7
Antigo*	22.5	21.0									21.7	17.4

L.S.D. .05 = 5.6 lbs. between means
L.S.D. .01 = 7.5 " " "

Plot size - 0.2 acre
Fertilizer - 16-20-0, 600 lbs. per acre

* Not included in the analysis

California table 2. Potato Scab Test Plot, Shafter, California, 1958

Kind	Tubers	No. tubers in class rating								Average	Marketable
		0	1	2	3	4	5	6	7		
	No.										Pct.
A 180-25	82	0	36	29	13	4				1.8	79.2
B 3428-20	87	2	7	12	20	24	19	3		3.4	24.1
Osage	63	0	2	7	14	22	14	4		3.8	14.2
B 3319-30	132	0	7	10	15	37	51	12		4.1	12.8
B 2874-4	111	0	7	9	19	27	18	31		4.2	14.4
B 3428-41	136	0	6	11	9	24	39	42	5	4.7	12.5
Antigo	92	0	2	6	2	9	26	41	6	5.1	8.7
B 3457-2	85	0	0	0	0	7	36	42		5.4	0.0
B 3140-36	59	0	0	1	1	5	14	38		5.5	1.7

Plot size, 0.05 acre; fertilizer, 16-20-0, 600 pounds per acre; classes 0.1 - 2, marketable; key to classes of scab: 0, free from scab; 1, 1% of surface area covered with scab; 2, 5% of surface area covered with scab; 3, 15% of surface area covered with scab; 4, 25% of surface area covered with scab; 5, 39% of surface area covered with scab; 6, 60% of surface area covered with scab; and 7, 90% of surface area covered with scab.

Classes 0, 1 and 2 considered marketable.

California table 3. Potato Yield Test Plot, Tulelake, California, 1958.

Kind	Replication:					Mean
	1	2	3	4	5	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Merrimack	42.0	65.0	79.0	65.0	42.0	58.6
Saco	47.0	78.0	81.0	75.0	70.0	70.2
Keswick	49.0	78.0	53.0	73.0	52.0	61.0
Plymouth	62.0	65.0	72.0	82.0	63.0	68.8
Tawa	64.0	74.0	51.0	47.0	69.0	61.0
Pungo	67.0	89.0	79.0	74.0	72.0	76.2
B 3428-20*	51					
B 3140-36*	73					
B 3874-4*	81					

L.S.D. .05 = 13.6 pounds between means
L.S.D. .01 = 18.4 pounds between means

* Not included in the analysis
Plot size, 0.1 acre; fertilizer, 16-20-0, 600 pounds per acre.

COLORADO

Leonard E. Jenkins

Cooperative Tests for Control of Insects Transmitting Potato Viruses, 1958

Tests were conducted on a field at the Greeley Potato Experiment Station. The field was planted with Triumph foundation seed as free of virus disease as possible.

The field was divided into 12 plots of 8 rows each 600 feet long. Four insecticides, Thimet, Systox, Malathion and Sevin, were selected to determine their ability to control the aphids and leafhoppers. Each insecticide with a fungicide (Diathane) was applied in two replicates. There were two replicates with fungicide alone and two untreated checks.

The application of materials was at logarithmic rates. The first was made June 24, when the potato plants were from four to eight inches high. Applications were repeated at 14-day intervals. Measurement of the effectiveness of treatments was made from insect population counts in the weeks following the application. The relative size of the insect populations were determined by counting the number of insects caught in 10 strokes of a sweep net and from those found on 10 leaves in each of 10 sampling areas in each plot.

Results. During the 1957 growing season 12 insecticides were screened by field tests. The selection of materials used in 1958 was based in part on the 1957 results.

The rank of materials used in 1957 is:

Number	Material	Mean aphid count
1	Thimet	1.3
2	Systox	2.5
3	Parathion	4.9
4	Toxaphene	9.5
5	Endrin	20.5
6	Malathion	22.4
7	Diazinon	41.1
8	Phosdrin	175.6
9	Dylox	299.8
10	Dieldrin	302.8
11	DDT	359.2
12	Chlorobenzilate	696.7

The materials used during the 1958 growing season were Systox, Malathion, Thimet and Sevin.

Insect counts have shown that treatments are effective in the following order:

Number	Material	Mean aphid count
1	Thimet plus Dithane	3.2
2	Systox plus Dithane	10.8
3	Malathion plus Dithane	15.9
4	Check plus Dithane	17.5
5	Check	64.5
6	Sevin plus Dithane	639.6

Analysis of variance:

Source of variance	Df.	S.S.	M.S.
1. Total	699	28,055.20	
2. Treatment	4	1,672.76	418.19**
3. Samples	9	540.70	60.06
4. Replicates	1	282.89	282.89**
5. Dates	6	1,293.11	215.52**
6. Error	679	27,265.74	35.737

**Significant at the 1% level

Data from the Sevin plus Dithane plots were not considered in the analysis.

In addition to obtaining information on the effectiveness of the insecticides it is planned to determine the incidence of leafroll in the tubers harvested from the plots. This will be done during the 1959 growing season.

COLORADO

J. L. Weigle, C. W. Frutchey, and A. M. Binkley

The new potato-breeding program of the Colorado Experiment Station is well under way. Formerly, we received third year seedlings from the U.S.D.A. Station at Greeley and tested them in various parts of the State. Now, we have a complete breeding program here at Fort Collins, from the production of true seed on through the various steps of the testing program. The first crop of thumbnail tubers was planted in isolation in the mountains last spring and 148 selections were made in the fall. The primary purpose of the program at present is to develop scab resistant varieties that are suitable for processing as chips. Resistance to other diseases will be included in the program at a later date.

Yield trials were conducted in three different areas of the State last season. The Gilcrest trial (Weigle table 1) was located in the sandy soil area northeast of Denver. The design used was a randomized complete block with five replications. Each plot contained two rows twenty-five feet long. The rows were thirty-four inches apart and the plants were twelve inches apart in the row. The plots were row-irrigated at an interval of four to six days, depending on conditions.

The San Luis Valley trial (Weigle table 2) was conducted at the Branch Station near Monte Vista. The altitude at the station is near 8000 feet and the soil is made up of gravel of different sizes, some quite large. The climate is very good for potatoes with the exception of the mid-summer freezes which fortunately don't occur every year, but the soil is less than ideal. The design used here was also a randomized complete block with five replications. Two rows twenty-five feet long made up each plot with the rows three feet apart and the seed spaced one foot apart in the rows. This trial was sub-irrigated with the sub level at or near fifteen inches during July and August.

The third trial (Weigle table 3) was located at the University Horticultural farm near Fort Collins. The soil on this farm is heavy and tight with a high water holding capacity. The plots here were row irrigated at ten to fourteen day intervals. The design for this trial was a randomized complete block with four replications. Each plot contained two twenty-five-foot rows. The rows were three feet apart and the seed piece interval was one foot. Difficulty was experienced in this trial with stem end dry rot and flea bettle larvae damage which lowered the percentages of number ones considerably.

The percentages of dry matter were determined by oven drying of weighted samples. The recorded data are averages of two or more samples of each variety. The percentages of reducing sugars are based on dry weight. They were determined by the Hassid's Ferricyanide Method. The color ratings for chips represent the R_d readings of a Gardner Color Difference Meter using a light yellow standardization plate which has a R_d value of 61.7. For purposes of comparison, R_d readings were taken on a number of brands of commercial chips obtained from the local grocery stores. These ranged from 22 to 42 with an average of 36.

The numbered varieties in all trials are Colorado seedlings unless otherwise indicated. One of these seedlings, 13178, has been released jointly by the U.S.D.A. and the Colorado Experiment Station as the variety Navajo.

Weigle table 1. Gilcrest potato trial, 1958.

Variety	Per Acre Total Yield	U. S. No. 1	Total Solids	Reducing Sugars	Color Rating of Chips
	Cwt.	Pct.	Pct.	Pct.	
Red La Soda	472.5	83	19.5		
Red Pontiac	462.8	79	18.0		
Manota	417.7	69	20.2	1.41	28.0
Early Gem	390.5	67	18.0		
Norland	380.1	85	18.5		
Cobbler	378.7	73	18.4	1.60	31.4
Red Beauty	366.2	82	20.0		
Tawa	353.3	79	20.2	1.20	34.4
Excel	342.6	83	20.4		
Wisc. 0112	338.6	71	21.0	1.88	29.4
Nordak	328.3	68	19.0	1.42	30.5
Redbake	317.2	78	21.3		
Norgleam	287.4	60	19.0	1.54	30.6
11889	287.0	78	19.9	1.25	33.2
11888	261.3	79	18.7	1.40	32.7
Dazoc	253.9	72	18.5		
L.S.D. 5%	36.8				

Weigle table 2. San Luis Valley potato trial, 1958.

Variety	Per Acre Total Yield	U. S. No. 1	Total Solids	Reducing Sugars	Color Rating of Chips
	Cwt.	Pct.	Pct.	Pct.	
Red McClure	490.2	77			
Katahdin	383.5	87	19.0	1.68	25.2
13178	343.1	81	21.6	1.28	31.4
12240	338.9	77	22.0	1.25	35.7
Russet Rural	337.1	80	21.2	1.51	30.7
Delus	324.0	84	22.2	1.11	38.1
Haig	287.4	89	19.6	1.30	38.1
13222	261.0	81			
Norland	248.2	88			
Red Beauty	245.2	86			
Cobbler	232.2	84			
11889	227.7	88	18.2	1.82	35.7

Weigle table 2. (Continued)

13928	226.2	72	22.2	1.24	32.2
Redbake	225.9	83			
Tawa	201.8	82	20.8	1.12	34.3
11888	152.4	85	20.4	1.38	34.6
L.S.D. 5%	25.3				

Weigle table 3. Fort Collins potato trial, 1958.

Variety	Per Acre Total Yield Cwt.	U. S. No. 1 Pct.	Total Solids Pct.	Reducing Sugars Pct.	Color Rating of Chips
Red Pontiac	435.2	70	24.3	.93	34.6
Kennebec	402.2	32	25.0	.85	39.1
Rukat	391.0	64	22.5	.95	33.0
Katahdin	346.1	57	24.5	.92	34.8
12240	339.1	55	25.0	.76	34.5
Russet Rural	329.8	57	24.3	.80	32.5
13178	306.7	64	25.1	.94	32.3
13222	295.0	54	24.0	.81	35.7
13928	259.6	54	24.9	.89	32.8
L.S.D. 5%	43.9				

CONNECTICUT
Arthur Hawkins

Two potato variety tests were conducted by the Storrs Agricultural Experimental Station, Storrs, Conn., on commercial potato farms in the Connecticut River Valley in 1958. Conditions were favorable for a good set of tubers. Somewhat better moisture supply and insect control at the Somers location resulted in a higher percentage of tubers over 1 7/8" and less off-shaped tubers than at the Windsorville location.

Experimental procedures, total yields, yields over 1 7/8", yields over 1 7/8" with seriously off-shaped tubers removed, dry matter, and tuber observations are given in Connecticut Tables 1 and 2.

Conn., Table 1. Yield1/ and specific gravity of potato varieties and seedlings, Windsorville2/, Conn., 1958

Variety or seedling 3/	Total yield per acre	Yield per acre, over 1 7/8"		Free of serious off shape4/		Dry matter5/
	cwt.	Pct.	cwt.	Pct.	cwt.	Pct.
Boone	421	95.1	400	91.4	385	16.3
Delus	267	96.6	258	92.0	246	18.9
Huron (12")*	385	84.0	323	77.9	300	18.2
Katahdin	337	93.6	315	92.7	312	17.1
Kennebec	403	90.3	364	83.3	336	17.1
Knik	437	89.4	391	83.5	365	17.8
Manota	254	89.9	228	87.8	223	17.6
Plymouth	279	91.2	254	90.3	252	18.0
B606-67	222	90.1	200	82.1	182	16.1
47156	315	94.7	298	87.6	276	18.3
B69-16	289	92.6	268	88.8	257	17.9
50B9-8	334	91.1	304	80.4	269	16.0
L.S.D. - .05					17	

1/ Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer wheel damage. Soil: Hartford fine sandy loam; potatoes previous 2 years. Fertilizer: 2,500 pounds 6-8-8 in row side bands plus 30 pounds N side dress.

2/ Season and conditions: Windsorville - 8 miles NE of Harford. Planted 5/12/58. Relatively dry in July, in late August and early September; irrigation used. On 9/12 all looked green - few aphids. On 9/22/58 Manota gone and Delus about gone; Boone 50 to 80% green; 47156, Knik, Huron 40 to 30% green in that order; aphid population up, especially since surrounding potatoes vine-killed.

3/ Seed supplied from Presque Isle, Maine through cooperation of R. V. Akeley, USDA, except Huron from Canada (9" spacing except *).

4/ Tuber observations: Boone - most tubers were smooth, oval shaped; some had deep blossom-end eyes; skinned easy; 4.4% over 4". Delus - most good shape; some deep-eyed and growth cracks. Huron - irregular shaped; some deep blossom-end eyes, medium to small size, 14% under 1 7/8" at 12" spacing vs. 6% for Katahdin at 9" spacing. Katahdin - some irregular and some with deep blossom-end eyes. Kennebec - smooth, white skin; some irregular and knobs. Knik - shallow eyed; fair, good to irregular; medium to large; some knobs. Manota - smooth; good shape; medium to small; slight russety skin. Plymouth - russety skin; most good shape. B606-67 - rough; poor shape; some deep blossom-end eyes; rough skin; some growth cracks; 3 of 38 hollow heart. 47156 - fairly good shape to some growth cracks; yellow flesh. B69-16 - irregular; poor shape; deep eyed; of 37 tubers cut 2 tubers with drought spot; 4 hollow heart; 11 severe stem end discoloration. 50B9-8 - fairly good shape to some irregular and growth cracks.

5/ Dry Matter calculated from specific gravity. Specific gravity by weight in air and in water. Average of 4 replications (10 tubers 2½" to 3" in diam. per sample).

Conn. Table 2. Yield1/ and specific gravity of potato varieties and seedlings, Somers2/, Conn., 1958

Variety or seedling3/	Total yield per acre	Yield per acre, over 1 7/8"		Free of serious off shape4/		Dry matter5/
	cwt.	Pct.	cwt.	Pct.	cwt.	Pct.
Boone	375	94.4	354	93.8	352	17.0
Delus	293	98.1	287	94.7	277	20.3
Huron (12")*	488	93.3	455	87.5	427	20.2
Katahdin	360	95.8	345	95.8	345	16.9
Kennebec	409	95.0	389	89.8	367	19.0
Knik	424	92.3	391	89.9	381	17.8
Manota	388	91.4	355	91.4	355	17.7
Plymouth	321	95.8	308	94.4	303	18.2
B606-67	287	93.0	267	90.7	260	17.6
47156	322	92.6	298	92.2	297	20.1
B69-16	412	96.2	396	94.4	389	19.2
L.S.D. - .05					17	

1/ Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer wheel damage. Soil: Enfield fine sandy loam. Newly cleared land first crop. Fertilizer: 2,500 pounds 5-10-10 plus 60 pounds N side dressed.

2/ Season and conditions: (Somers - 20 miles NE of Hartford) Planted May 26, 1958. Ample rainfall July. Irrigated first week and last week of August. Excellent fleabeetle and aphid control. On 9/23/58 plants yellowing rapidly; Huron and B69-16 80% green, compared with Knik 50%; B606-67 and 47156, 40%; Katahdin 25%; Kennebec and Delus 15%; Plymouth 10%; Boone and Manota 5%.

3/ Seed supplied from Presque Isle, Maine through cooperation of R. V. Akeley, USDA, except Huron from Canada (9" spacing except *).

4/ Tuber observations: Boone - fair shape; smooth skin; some irregular, some large. Delus - nice shape; some large. Huron - irregular shape; some very poor shape; deep blossom-end eye. Kennebec - fairly good; some pear shaped. Knik - good oval to blocky shape; shallow eyes; some irregular. Manota - good shape; small (heavy set); shallow eyes; considerable amount of black scurf (rhizoc.). Plymouth - fairly good oval shape; russety skin. B606-67 - medium to small; fair to irregular shape. 47156 - oval, fairly good shape; yellowish skin and flesh. B69-16 - slightly irregular to poor shaped; deep eyed.

5/ Dry matter calculated from specific gravity. Specific gravity by weight in air and in water. Average of 4 replications (10 tubers $2\frac{1}{2}$" to 3" in diam. per sample).

DELAWARE

E. P. Brasher

Yield and Solids Tests of Varieties and Seed-Source Study of Delus

Eighteen varieties and seedlings and 3 sources of Delus were tested. The sources of Delus seed were: USDA (Maine), Eastern States (Maine), and home-grown, late (planted in June, harvested in October).

The experimental conditions and procedures were as follows: Location, Substation Farm, Georgetown; soil, Norfolk sandy loam; previous crop, tomato; plot size, 24 feet x 34 inches; spacing in row, 8 inches; plot design, randomized block; planting date, April 15; fertilizer, 2,000 pounds of 5-10-15 per acre in bands at planting time; irrigation, when soil moisture dropped to 50 percent available; fungicide, Zineb; insecticide, DDT; harvesting date, August 20; growing conditions good. The results are shown in Delaware table 1.

Delaware table 1. Variety yield test and seedsource study of the Delus variety, Georgetown, Delaware, 1958.

Variety	Seed Source	Yield per acre	U. S. No. 1	Solids
		Cwt.	Pct.	Pct.
Onaway	USDA	427	90	12.7
Pungo	"	399	91	15.3
Irish Cobbler	"	359	85	15.4
Katahdin	"	350	91	13.0
Delus	"	340	90	16.1
B 3309-8	"	329	74	10.7
B 3095-18	"	308	88	12.9
B 2368-13	"	302	82	12.0
B 3299-13	"	291	83	15.1
Tawa	"	285	90	14.4
B 3556-11	"	276	81	17.3
Saco	"	275	62	12.9
Delus	Home-grown, late	256	95	17.1
B 2922-26	USDA	244	81	13.1
Delus	Eastern States	240	92	15.2
B 3319-30	USDA	220	56	12.2
B 595-76	"	217	84	16.3
B 3428-20	"	203	90	15.9
B 2874-4	"	173	49	14.2
B 2162-36	"	115	51	16.0
LSD .05		36	--	0.7
LSD .01		49	--	1.0

In yielding ability Onaway was the most outstanding, followed by Pungo, Irish Cobbler, Katahdin and Delus. B 3556-11 and Delus were the most outstanding from the standpoint of total solids. Differences existed among the 3 sources of Delus seed.

Size and Shape of Delus Seedpieces

The experimental procedure and conditions for this study were similar to those described for the variety trials except that 3-row plots instead of 1-row plots were employed. Only the center rows were harvested for records. The various treatments and their results are shown in Delaware table 2.

Delaware table 2. Effect of size and shape of Delus seedpieces on yield.

Treatment	Yield per acre U.S. No.1	Yield per acre Total	U.S. No.1
	Cwt.	Cwt.	Pct.
3/4 oz. pcs. cut from 3-oz. potatoes	237	249	95
1 oz. " " " 2-oz. "	286	296	97
1½ oz. " " " 3-oz. "	260	273	95
1 oz. " " " 4-oz. "	219	229	96
2 oz. " " " 4-oz. "	273	282	97
1½ oz. " " " 6-oz. "	260	275	95
3 oz. " " " 6-oz. "	308	323	96
1 oz. " " " 8-oz. "	230	241	96
2 oz. " " " 8-oz. "	229	241	95
2 oz. whole potatoes	319	331	96
LSD .05	31	33	--
LSD .01	42	45	--

A study of the results in Delaware table 2 reveals that some highly significant differences in yield exist among the various treatments. In general the smaller seed potatoes produced the most economical yields. The 2-ounce whole potatoes were the most productive. They produced 319 cwt. per acre in contrast to 282 and 241 for 2-ounce pieces cut from 4-ounce and 8-ounce potatoes, respectively. Similar differences existed among the 1 and 1½-ounce pieces cut from different sized potatoes. Perhaps the most economical yields were obtained from 1-ounce pieces cut from 2-ounce potatoes.

FLORIDA
(Hastings)
A. H. Eddins

Reaction of Potato Varieties and Seedling Selections to Corky Ringspot

Seven numbered USDA seedling selections and 13 named varieties were planted in corky ringspot-infested soil in 1958 and each was replicated 5 times in 10- to 25-hill plots. The US 1A and 1B size tubers were washed and examined for external symptoms of the disease. Results of these examinations are reported in Florida table 1.

Florida table 1. Number and weight of healthy and corky ringspot-affected tubers of different potato varieties and seedling selections grown in infested soil in 1958.

Variety or Selection 1/	Number of Tubers: Healthy	Number of Tubers: Infected 2/	Number of Tubers: Infected Pct.	Pounds of Tubers: Healthy	Pounds of Tubers: Infected 2/	Pounds of Tubers: Infected Pct.
Boone	214	None	None	34.8	None	None
Delus	160	None	None	39.8	None	None
Plymouth	294	None	None	67.2	None	None
Pungo	300	None	None	62.4	None	None
B 294-65	209	None	None	35.7	None	None
B 606-3	153	None	None	30.4	None	None
Saco	338	1	0.3	47.1	0.1	0.2
Merrimack	336	1	0.3	73.9	0.2	0.3
White Rose	290	1	0.3	69.8	0.3	0.4
B 926-9	171	2	1.2	34.0	0.3	0.9
Eigenheimer	77	1	1.3	8.7	0.1	1.1
1858	142	1	0.7	23.5	0.3	1.3
B 381-2	80	1	1.2	11.7	0.4	3.3
B 595-76	250	18	6.7	39.0	3.9	9.1
Red Pontiac	369	48	11.5	83.1	9.5	10.3
Antigo	77	7	8.3	11.9	1.4	10.5
Cherokee	341	31	8.3	54.7	6.9	11.2
Sebago	122	29	19.2	24.3	6.5	21.1
Kennebec	292	70	19.3	59.5	20.0	25.2
B 3010-4	32	7	18.0	4.8	2.2	31.4

1/ Ten to 25 seedpieces of each were planted 8 inches apart in the row and replicated 5 times.

2/ Includes those with both internal and external symptoms.

Four varieties, Boone, Delus, Plymouth and Pungo, and 2 seedling selections, B 294-65 and B 606-3 showed no symptoms of the disease in the tubers. Infection in the other 15 selections and varieties ranged from 0.2 to 31.4 percent of affected tubers by weight. Six of these showed mild infection ranging from 0.2 to 3.3 percent and infection in the other 7 selections and varieties varied from 9.1 to 31.4 percent. Infection in the check variety, Sebago, was 21.1 percent of the tubers.

Potato Variety and Seedling Selection Trials in 1958

E. N. McCubbin and A. H. Eddins

In 1958, 3 stocks each of 3 varieties, 1 stock of 7 other varieties, and 1 stock of 21 seedling selections were grown and compared for yield and tuber characteristics at the Potato Investigations Laboratory. This made a total of 37 entries in the test. The seedling selections except for the item 4RM3 were supplied by R. V. Akeley, Vegetables and Ornamentals Research Branch, USDA, Beltsville, Md., and T. P. Dykstra, Louisiana State University, Baton Rouge, Louisiana.

Data concerning the test are as follows: location, Hastings, Florida; soil, Bladen fine sandy loam; plot size, 12 feet x 40 inches; plot design, randomized block; planting date, January 16, 1958; fertilizer, 2,500 pounds of 7-9-9 per acre applied in bands; fungicide, Parzate; insecticides, DDT and parathion as needed; harvest date, May 19, 1958 -- 123 days after planting.

The potato growing season at Hastings in the winter and spring of 1958 was the coldest experienced in many years. Low temperatures and freezes kept potato plants below ground until March and harvest of the crop was delayed 3 to 6 weeks beyond the normal harvest season.

Four seedling selections, B 2368-4, B 3602-4, B 3677-1 and 1859 and 2 varieties, Merrimack and Red Pontiac from Maine outyielded Sebago from Maine, the standard variety at Hastings, Florida table 2, but increases in yields were not significant. Red Pontiac is used commercially at Hastings where a red variety is desired. Merrimack has been tried in small commercial plantings and rejected as being too rough and late in comparison with Sebago. B 2368-4 produces red tubers that are a little too light in color and rough in shape. It produces high yields and recovers well from frost damage, see next section, and may have a place where a red variety is acceptable. B 3602-4 is a white selection and produces smooth potatoes. It has produced yields above or equal to those of Sebago for 2 seasons at Hastings.

Five other varieties and 4 seedling selections produced yields that were not significantly lower than those of Sebago from Maine.

Recovery from freeze damage. Most of the potato variety and seedling selections included in the above trial were tested for their ability to survive or recover from frost or freeze damage and produce potatoes. Eight 2-ounce seedpieces were cut from each stock, dipped in a solution of ammonium thiocyanate to break dormancy and planted. Seedpieces of each stock were spaced one foot apart in rows 40 inches apart. Culture for this planting was the same as that for the potato variety trial reported above, except for the planting date, December 5, 1957 and the harvest date May 9, 1958--155 days after planting. Again, low temperatures and freezing weather kept potato plants below ground until March.

Seedling selection, B 2368-4, a red one, recovered from the freeze damage and produced an average of one pound of potatoes per hill, Florida table 3. One other seedling selection, B 355-35, and 3 varieties, Merrimack, Delus and Saco withstood the freezes and produced more than 3/4 pound of potatoes per hill.

These results, as did those obtained in 1957, indicate that potato varieties and seedling selections do vary considerably in their ability to recover and produce potatoes when their tops are killed by freezing temperatures. This test will be continued to select varieties and seedlings possessing this specific ability.

Florida table 2. Percent stand and yield of 31 potato varieties and seedlings tested at Hastings, Florida in 1958 1/.

Variety or Seedling	Stand 2/ Count	Mkt. yields per acre 4/ US 1A	US 1A+1B	Crop 4/ Marketable
	Pct.	Cwt.	Cwt.	Pct.
B 2368-4	100	212	242	99.6
Merrimack	100	189	205	96.2
B 3602-4	100	182	205	93.3
B 3677-1	100	180	209	98.9
Red Pontiac (Me) 40°F 3/	100	178	213	98.6
1859	97	169	209	97.2
Sebago (Me) 40°F 3/	100	168	202	98.6
Saco	97	165	208	99.4
Kennebec (Me)	95	163	179	89.3
Sebago (Ca)	95	160	190	97.1
Pungo	95	156	181	93.9
Kennebec (Me) 40°F 3/	85	150	171	88.0
3769	87	148	178	96.8
Kennebec (Va) 40° F 3/	95	145	169	95.4
Plymouth	97	142	161	97.1
B 355-35	90	137	162	93.0
B 3626-15	88	135	173	98.6
B 2368-13	97	129	159	98.8
Cherokee	100	123	160	92.0
Sebago (Va) 40°F 3/	97	115	146	90.4
6509	100	115	152	96.1
Delus	90	114	124	93.0
B 3692-4	87	107	146	92.7
Red Pontiac (Va) 55°F 3/	100	105	137	99.5
6077	95	104	138	97.1
B 3595-5	97	101	127	99.7
3674	93	98	146	97.8
B 929-23	100	95	151	98.3
B 3725-1	85	92	97	72.0
4 RM 3	88	87	123	91.1
6543	77	78	111	94.8
Antigo	95	71	89	96.7
Red Pontiac (Va) 40°F	100	66	96	98.7
6003	93	61	76	94.9
6515	75	47	71	96.1
5347	82	43	74	92.1
B 2938-22	97	35	59	93.4
LSD .05		56	55	
LSD .01		74	73	

1/ Based on yields of 12-foot single row plots replicated 5 times.
2/ Stand counts April 1, 1958--75 days after planting.
3/ Seed tubers stored at these temperatures from harvest until shipped to Hastings in December, 1957.
4/ Does not include sunburn, injured or otherwise unmarketable tubers.

Florida table 3. Recovery from freeze damage and yield and surface color of 34 potato varieties and seedling selections at Hastings, Florida in 1957-58[1/]

Variety or Selection	Hills dug	Marketable per Hill		Skin Color
		Tubers	Pounds	
	No.	No.		
B 2368-4	8	5.3	1.00	Lr
B 355-35	8	3.6	.96	W
Merrimack	8	3.6	.91	W
Delus	8	3.5	.85	W
Saco	8	4.4	.80	W
B 2368-13	8	3.8	.73	Lr
3674	8	4.8	.73	W
B 2938-22	8	4.0	.66	W
B 929-23	8	4.0	.63	W
Plymouth	7	3.3	.63	yellowish
B 3725-1	5	3.4	.62	W
B 3602-4	8	3.4	.61	W
Pungo	8	3.3	.61	W
4 RM 3	8	4.0	.61	W
3769	8	4.6	.61	W
B 3677-1	8	3.4	.55	W
B 3692-4	8	4.3	.53	W
Kennebec	8	2.8	.50	W
B 3626-15	8	2.8	.47	W
6077	8	3.6	.47	Lr
2988	8	3.0	.40	W
Cherokee	8	3.0	.38	W
6003	7	2.3	.35	W
6017	7	2.7	.35	Lr
6279	8	2.3	.31	R
5263	8	1.9	.28	R
6264	7	2.1	.28	R br.
1859	8	1.8	.27	R
6543	5	2.6	.22	W
6509	5	2.2	.20	W
B 3595-5	2	1.5	.20	W
5347	7	1.7	.15	W
Sebago	7	1.1	.08	W
5615	8	-	.00	Br.(tiny)

1/ Based on yields obtained from planting 8 2-ounce seedpieces 12 inches apart in rows 40 inches apart.

FLORIDA

Sub-Tropical Experiment Station

John C. Noonan

Potato production was generally unsatisfactory this past season. Unusually cold weather began the second week of January and continued through February, with a foliage killing frost the first part of February. Potato yields were severely reduced.

The yields were taken from 20-foot plots, replicated four times and expressed as 50-pound bags per acre. The plots were fertilized with 1200 pounds of 6-6-6 and sprayed with insecticides and fungicides as necessary. The seed-pieces were placed six inches apart in the rows.

Potato seed was received from Dr. T. P. Dykstra, USDA, Baton Rouge, Louisiana. The seed had been grown in Tennessee.

	50-lb. bags/acre		50-lb. bags/acre
Triumph	36	La 6088	140
Pontiac	120	La 6136	52
LaSoda	67	La 6219	51
Red LaSoda	32	La 6255	8
La1859	116	La 6279	78

From "Duncan's Multiple Range Test", the following information was obtained on the yields of U.S. No. 1 tubers. There were no significant differences in yield among La6088, Pontiac and La1859. Seedling La6088 was significantly higher in yield than the remainder of the varieties and seedlings. There were no significant differences in yield among Pontiac, La1859, La6279 and LaSoda. Seedling La1859 was significantly higher in yield than the remaining varieties and seedlings. There were no significant differences in yield among La6279, LaSoda, La6136, La6219, Triumph and LaSoda. Seedling La6279 and LaSoda yielded significantly higher than La6265.

There have been some discussion as to the use of whole B size tuber for seed. Whole tubers of certified northern seed of Pontiac and Sebago were planted, one half were left intact and one half had the stem end sliced off.

	50-lb. bags/acre		50-lb. bags/acre
Pontiac, whole B's	271	Sebago, whole B's	200
Pontiac, cut B's	193	Sebago, cut B's	71
Pontiac, regular cut	207	Sebago, regular cut	151

Pontiac, whole B's yielded significantly more than any of the remaining treatments. Pontiac, cut B's, Pontiac, regular cut and Sebago, whole B's were not significantly different in yield but were significantly higher in yield than Sebago, cut B's.

FLORIDA (SANFORD)
Walter C. Scudder

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Potato Variety Trials in 1958

Experiment VT - 52. In cooperation with the National Potato Breeding Program, fifteen potato lines were obtained from R. V. Akeley of the USDA. Three additional lots were received, as follows: a second stock of Red LaSoda from Warren A. Trank of the Nebraska State Seed Certification Association, Sebago from E. N. McCubbin of the Potato Investigations Laboratory, and Red Pontiac from the Kilgore Seed Company. Fifteen pounds of each of these 18 stocks were cut into approximately 2-ounce seed pieces, sufficient for 120 hills (see Scudder table 1).

The field was laid out with single-row plots 20 feet long and six randomized replications. Each plot contained 20 hills spaced twelve inches apart and planted January 1. The crop was fertilized using 1000 pounds per acre of 5-5-8 commercial fertilizer stirred in the row prior to planting along with 2 pounds of dusting sulfur per 300 feet for scab control. This was followed by a second 1000 pound application of 5-5-8 as a top-dressing on April 1. Overhead sprinkler, irrigation was supplied twice during dry periods and the crop was sprayed as needed for insect and disease control. Late blight did not develop. The main problems encountered resulted from two severe windstorms during February and March. The first uncovered many of the seed pieces.

The experiment was harvested on June 9. The data, summarized in Scudder table 2, include the yields of U.S. No. 1 and No. 2 tubers and tuber defect observation ratings for scab, heat sprouting, and second-growth. The stock of Red LaSoda obtained from Nebraska topped the list, as arranged in order of U.S. No. 1 tuber-yield. This lot also was the only one completely free from heat sprouting in the field at harvest time. This condition was apparently the result of a period of very hot weather preceding the delayed harvest. The potatoes had been mature about ten days. Fourteen out of the 18 lines in the test excelled Sebago, the leading commercial variety in North-Central Florida. The poorer performance of the Red LaSoda stock supplied by Akeley suggests a difference in seed vigor.

Scudder table 1. Yields expressed as hundred-weights per acre (Irish potato variety trial - Experiment VT - 52, Sanford Station Farm, Spring 1958).

Variety	Seed Source	Yield - Cwts. per acre No. 1	No. 2	Total
Red LaSoda	Neb. (Trank)	167	13	180
B 7368 - 4	USDA (Akeley)	153	19	172
Pungo	"	147	10	157
Kennebec	"	144	11	155
B 69 - 16	"	137	13	150
Merrimack	"	132	12	144
Boone	"	127	9	136
Plymouth	"	118	6	124
Cherokee	"	117	23	140
Onaway	"	117	8	125
Red Pontiac	Kilgore	116	16	132
Red LaSoda	USDA (Akeley)	116	7	123
Katahdin	"	97	13	110
Teton	"	95	18	113
Sebago	Potato Lab. (McCubbin)	86	15	101
B 3454-5	USDA (Akeley)	77	29	106
50 B 9-8	"	74	10	84
B 3319-30	"	27	47	74
L.S.D. - 5% level		16	—	17
1% level		21	—	23

Scudder table 2. Irish potato varieties tested and summary of yield data and defect ratings, Sanford Station Farm, Spring 1958. All data are means of six replications.

Variety	Seed Source	U.S. Yield per acre No.1	No.2	Total	Defect ratings(0-10 scale)* Scab	Sprouting	Second-growth
		Bu.	Bu.	Bu.			
Red LaSoda	Neb. (Trank)	278	23	301	9.8	10.0	9.8
B 2368-4	USDA (Akeley)	255	32	287	9.5	7.8	8.5
Pungo	"	244	18	262	9.7	9.2	8.7
Kennebec	"	240	19	259	10.0	9.5	9.3
B 69-16	"	229	22	251	10.0	9.0	9.2
Merrimack	"	220	21	241	10.0	9.3	9.5
Boone	"	211	17	228	9.7	9.8	9.8
Plymouth	"	196	11	207	9.3	9.5	10.0
Cherokee	"	194	40	234	9.3	9.3	8.3
Onaway	"	194	14	208	9.7	9.3	9.5
Red Pontiac	Kilgore	194	26	220	9.0	9.8	9.2
Red LaSoda	USDA (Akeley)	193	13	206	9.3	9.8	9.8
Katahdin	"	161	23	184	9.8	9.3	9.8
Teton	"	159	29	188	10.0	9.7	9.3
Sebago	Pot. Lab. (McCubbin)	144	24	168	9.0	9.7	10.0
B 3454-5	USDA (Akeley)	128	49	177	9.0	8.8	9.7
50 B 9-8	"	123	17	140	10.0	9.0	9.5
B 3319-30	"	45	79	124	9.8	9.7	8.2
L.S.D. - 5% level		26	—	27	N.S.	0.8	0.8
1% level		35	—	38	N.S.	1.1	1.0

* Rating scales (0-10): 1-Very severe, 100% of tubers showing severe defects; 10 - No tubers showing defects.

GEORGIA

J. E. Bailey

In 1958, cooperative potato yield trials with U. S. D. A. were conducted in the mountain area of Georgia. All selections were planted April 3 and harvested July 24 except Early Gem and B 605-10 which were harvested July 7. Rainfall from planting to harvesting was 11.78 inches. Fertilizer (4-12-12) was applied at the rate of 1,000 pounds per acre. Four replications of each variety were planted in 25-foot rows and these seedpieces were spaced 12 inches apart. The germination was 100 percent. The results are presented in Georgia table 1.

Georgia table 1. Potato variety test, Blairsville, Georgia, 1958

Variety	Yield per acre		
	U.S.No.1	U.S.No.2	Total
	Bu.	Bu.	Bu.
B 73-3	121.3	20.8	142.1
B 605-10	193.6	19.6	213.2
Delus	203.4	12.3	215.7
Plymouth	133.5	34.3	167.8
Cherokee	155.6	38.0	193.6
Boone	176.4	24.5	200.9
Kennebec	204.6	25.7	230.3
Sebago	207.0	18.4	225.4
Merrimack	165.4	19.6	185.0
Saco	194.8	28.2	223.0
Pungo	248.7	15.9	264.6
Early Gem	159.3	34.3	193.6
B 2368-4	260.9	17.2	278.1
50B9-8	221.7	26.9	248.6

IDAHO (Aberdeen)

W. M. Iritani and D. R. Bienz

Four selections from the USDA Western Regional Potato-Breeding Program were compared in yield, grade and quality with the 2 popular varieties grown in Idaho, Early Gem and Russet Burbank. The seedlings used were selections made by a Potato Selection Committee who meet twice each fall to evaluate promising seedlings from the USDA Potato-Breeding Program at Aberdeen. The evaluations are made by comparing the seedlings with the Russet Burbank potato in appearance, vine type, disease resistance, yield and quality including specific gravity as well as other processing qualities.

The potatoes were planted May 15, 1958 on a field cropped the previous year to wheat. Fertilization was applied at the rate of approximately 60 pounds per acre of N and 75 pounds per acre of P_2O_5. This rate was insufficient for maximum yields. However, it was felt that the low fertility would give a better expression of early dying, symptoms in the plants. Resistance to early dying is one of the main considerations in the breeding program. The plots consisted of one 32-foot row which was replicated 5 times. The growing season was rather poor as evidenced by yields lower than anticipated throughout the Snake River Valley growing area. The plots were harvested on October 8.

The performance of the 4 seedlings and 2 varieties are shown in Idaho table 1. Yields were all quite low in comparison to previous years. This may be explained by the unusually hot weather during part of the growing season, by low fertility and also by a heavy incidence of verticillium wilt or "early dying". Seedling A 170-9 was heavily infected by leaf roll. The larger yields of the other seedlings in comparison to Russet Burbank may partially be explained by their apparent resistance to early dying.

Idaho table 1. Comparison of 4 seedlings and 2 varieties planted at 3 spacings for yield, grade and quality, Aberdeen, Idaho, 1958.

Variety	Yield per acre Total	Yield per acre No. 1	U.S.No.1	Total Solids
	Cwt.	Cwt.	Pct.	Pct.
A 170-9	127	42	33.0	21.5
A 180-26	246	140	56.9	21.4
A 180-24	219	151	68.9	19.7
A 175-7	261	213	81.6	21.4
Early Gem	165	113	68.4	18.2
Russet Burbank	171	71	41.5	20.7
L.S.D. .01 level	19	17		

Average yields for spacing distances (all interactions of spacing x variety were not significantly different).

	6-inch	9-inch	12-inch	LSD at .05
Total Yield (Sx/acre)	196	205	192	10
Yield No. 1 (Sx/acre)	120	125	120	N.S.

IOWA

August E. Kehr, James C. Horton, Edwin T. Hibbs,
Lind Sanford, and Frank Manzer

The potato improvement projects in Iowa are conducted cooperatively between the U. S. Department of Agriculture and the Iowa Agricultural Experiment Station. This work includes breeding phases, disease study phases, and insect study phases. In the Iowa Agricultural Experiment Station these phases of the program are done cooperatively between the Departments of Horticulture, Plant Pathology, and Entomology.

Distributions. Seed, seedling tubers, and clonal selections were shipped to various cooperators as follows:

Seed:	Cooperator	No. of lines	Amt. (Est.)
Alaska	C. H. Dearborn	2	3000
Canada	G. R. Johnston	4	4000
Louisiana	T. P. Dykstra	36	35000
Seedling tubers:			
Haiti	Luc Timmer	48	1400
Mexico	John Niederhauser	39	2300
North Dakota	Ben Picha	80	2000
Ohio	J. P. Sleesman	11	400
Texas	W. B. Cook	68	8200
Clonal lines:			
Alaska	C. H. Dearborn	9	
Ohio	J. P. Sleesman	83	
Maine	Reiner Bonde	3	
Maine	Don Merriam	6	
Maine	G. W. Simpson	29	
Texas	W. B. Cook	47	

Seed and seedling production. Crosses for the potato program are made in the greenhouse during February to April. By using artificial lights and heat controls we can duplicate field conditions of temperature and light. Both blooming and seed set are exceptionally good. Parents were selected and crosses made based upon the following objectives in the order given: high yield; high quality (interior color, high solids, texture, etc.); scab resistance and other diseases.

Crosses made in the greenhouse included resistance to scab, late blight, virus X, leafroll, verticillium wilt, ring rot, virus A, and virus Y. Seed production was excellent and a total of 478 combinations were made with several million seeds produced on total.

A total of about 35,000 seedlings were grown and planted at Clear Lake. From these about 350 single hill selections were made for further testing or about 1 percent of the total planting. In addition to our own seedling tubers, lines were received from cooperators as follows:

Cooperator	Number of Progenies	Est. No. of Seedlings
T. P. Dykstra, La-USDA	9	700
John McLean, Colo-USDA	42	5600
R. V. Akeley, USDA	33	5400
Robert Johansen, N. Dak.	36	3700
Julian Miller, La.	9	3000

We have been able to expand the production of seedling tubers by planting the young seedlings in 3-inch clay pots and then placing them under the screen cages (used earlier in summer for onion seed production) on the Horticulture Farm. The screen offers sufficient shading to prevent wind drying or sun damage, but yet gives sufficient light to develop tubers. By this method we will produce about 40,000 seedling tubers of our own breeding for planting in 1959. It can be noted that large populations are required in order to obtain relatively few selections.

Increase Plots. Our increase and maintenance plots were grown on the Horticultural Farm at Ames in 1958. In past years these plots were grown at Northwood, North Dakota. The change this year was necessitated because our cooperator in North Dakota, Dr. William G. Hoyman, was transferred to the State of Washington.

Another change started in 1958 was our method of indexing tubers. This year we indexed each individual tuber both at Ames and at Homestead, Florida. Any tuber which was questionable at either place was discarded. Thus all our increase lots were double checked to eliminate seed-borne diseases. This procedure is necessary so that we may maintain disease-free stock for distribution and further increase. The Florida index readings were made through the cooperation of Mr. Wes Porter, former Program Director, Maine State Seed Potato Board. Land for growing these potatoes was provided by the Sub-Tropical Experiment Station through cooperation with Mr. John Noonan and Dr. G. D. Ruehle, Superintendent.

The effectiveness of this indexing program was evident in the field last summer when we found almost no plants to rogue for visible symptoms of plant viruses. This same program is to be followed through another cycle of disease eradication, and it appears that the resulting stock should be almost 100 percent maintained. Our seedpieces at Clear Lake were all treated in a streptomycin-captan dust to prevent seedpiece decay. This treatment has also given us increased vigor in our Northwood plots where the seedpieces are cut several weeks in advance of planting.

3-Hill Tests. Early generation material is planted in these tests. These are observed for various characteristics including vine type and vigor, maturity, general appearance, specific gravity, scab resistance, internal defects, external defects, flesh color, and texture. Many selections are discarded in these tests. There were 636 entries in 1958. Of this number 156 were selected for further testing in the 25-hill test for 1959. This amounts to about 87.5 percent reduction in progenies maintained or a selection ratio of about one out of five.

25-Hill Tests. These tests are early generation testing procedures designed to give us yielding ability of clones which have survived the earlier selection in the 3-hill tests. The entries in these tests represent lines which may show some promise for ultimate release as a named variety, or in a few cases lines in which sufficient stock was not available for a larger yield test. The results of this test are shown in Iowa table 1. Lines which appear especially worthy of additional testing are: Ia 1422-1, La 1354, B 929-23, Ia 5560-3, ND 4160-Ia 3, Ia 1213-2, ND 4159-Ia 1, Ia 14141-5, Ia 1442-4, Minn 355, Ia 1441-3, B 3453-2, and La 6618-4.

Iowa Yield Test (early). This test included 13 entries with Cobbler as a check variety, although Cobbler is medium maturity. No entry yielded more than Cobbler, but several approached this level. Tawa performed exceptionally well in 1958, and was quite outstanding in this trial, outyielding Cobbler in US No. 1 potatoes per acre. It compares will with Cobbler for quality. Another selection which has definite possibility and which is earlier than Cobbler or Tawa is Ia 1403-4. This selection is an extremely smooth, white-skinned variety with scab, late blight and virus X immunity. Norland is early, but lacked its usual yielding ability. It is a light red in color with some scab resistance (see Iowa table 2). Ia 803-1 is also outstanding and is well liked in Canada.

Iowa Yield Test (late). The early and late varieties were placed in separate trials to avoid the possibility of competition, or more accurately the possibility of lack of competition which occurs when a late and early variety are planted side by side. The late test included 21 varieties with Red Pontiac and Cherokee as check varieties. Of these six are named varieties. Only Saco yielded more than Red Pontiac. However, among the red varieties, outstanding are B 2368-4 and Ia 1426-1, both of which yield close to Red Pontiac. B 2368-4 is scab resistant but is as rough as Red Pontiac and is low in solids. Ia 1426-1 is quite smooth, scab resistant, late blight resistant, and has solids which compare very favorably with Cobbler. It is one of the most promising of the new reds with Cobbler maturity.

Among the white lines B 3692-4 has been consistently high yielding over a period of 2 years. It is fairly resistant to scab, late blight, and verticillium wilt, as well as having solids equal to Cobbler. In yielding ability B 3511-17 stands high, but is low in quality (see Iowa table 3). It is important to report that both B 2368-4 and Saco were high in yields in 1957.

North Central Yield Trial - Iowa. These trials represent the best advanced lines from the North Central States. Similar tests are duplicated in ten locations. Outstanding early lines were ND 3324-2, Norland, and Nebraska 315.48-3X. ND 3324-2 is an early, very smooth white with some scab and late blight resistance. Nebraska 315.48-3X is a smooth long red, later than Cobbler, but has no scab resistance. Both of these selections are low in solids, as is Norland.

Outstanding late selections were B 2368-4 (see also Iowa Late Yield Test) and Ia801-10. The selection Ia 801-10 is very scab resistant, resistant to late blight, immune to virus X, and is high in solids. In 1957, this selection was the highest in total solids of any of the newer selections in Canada.

Iowa table 1. 25-hill yield trial, Clear Lake, 1958.

Variety	Color	Mat.	U.S.No.1 per acre	Total solids	Scab A	Scab T	Remarks
			Bu.	Pct.			
Ia 1412-4	W	L	813	18.2	T	3	Nice skin, good shape
Ia 1422-1	W	L	776	17.5	3	1	Round sh, v.smooth,netted skin
La 1354	R	ML	733	18.8	4	2	Nice sh, lt.color, smooth
B 929-23	W	ML	675	19.0	3	2	V.smooth, semi-russet
Ia 5560-3	W	L	621	17.3	T	2	Dull skin, good sh.
La 1859	R	L	668	17.3	T	3	Lt.red, smooth skin
ND 4160-Ia 3	W	ML	663	17.1	T	1	Fair skin, shiny, sl.flat,sm.
Osage	W	ML	653	16.7	T	1	Nice skin, sl.flat, elongate
Ia 1213-2	W	M	624	16.7	T	3	Dull skin, nich sh., smooth
Ia 781-7	W	L	641	18.8	T	1	Nice skin, good shape
ND 4159-Ia 1	R	L	606	18.6	2	1	Lt.red skin, russet, ex.sh.sm.
Ia 1441-5	W	ME	600	15.8	T	2	Nice skin, fair sh, apical end [deep
Ia 1442-4	W	M	506	17.7	T	3	V. sm, nice long wh., sl.flat
Ia 911-2	W	ME	608	15.0	3	2	Smooth, nice shape, dull skin
Minn 355	W	L	590	18.6	4	2	Much #2 scab, sl.flat, smooth
Essex	W	ML	607	15.4	T	3	Dull skin, sl. rough
X 528-170	W	VL	469	21.2	T	1	Rough, semi-russet
F 52-Ia 1	W	ML	521	18.2	3	2	Fair skin, indented eye end [sl. flat
CS 18-2	W	ML	542	22.7	1	3	Fair skin, nice shape
Ia 1441-3	W	L	509	18.2	3	3	Long white, very sm. few gc
Teton	W	M	564	16.7	T	2	Fair skin, sm, fairly wh.
B 3453-2	R	M	549	18.8	1	1	Russetted, lt.red,sm.deep apical [eye
Picha 54.9-55-7	R	M	577	17.5	T	1	Nice red color, fair sk,deep [apical end
Ia 1092-2	W	ML	475	16.2	T	3	Dull skin, smooth
La 6618-4	R	ME	514	17.1	2	1	Attractive red,nice sk,nice sh.
Ia 1436-1	W	M	535	16.5	T	4	Fair skin, nice shape
Neb.223.48.1	W	ME	445	16.0	1	2	Golden sk, small size, smooth
CS 15-Ia 3	W	ML	538	20.3	4	3	V. scabby, nice sh, dull skin
ND 3981-1	R	M	559	20.7	T	3	Rus'td rd, lt.color, fairly sm.
Ia 874-2	W	ML	564	19.2	1	2	Nice shape, russet
Ia 5583-3	W	ML	552	16.5	T	3	Fair skin, sl.deep, apical end
Ia 1419-1	W	ML	546	18.6	4	2	Golden skin, small
B 2067-52	W	ML	511	18.4	2	1	Nice wh. skin, smooth
Ia 1412-2	W	ME	395	14.8	T	2	Pointed, fair skin
B 922-12	W	ML	488	16.5	T	3	Pointed, flat, fair skin
B 3139-24	W	L	496	16.2	T	3	Much #2 sc, gc, dull skin
Ia 1107-3	W	ML	522	17.1	T	3	Nice skin, sl.flat, smooth
B 3391-19	W	M	540	19.4	1	3	Some sq. sl flat, gld'n sk,sm.
Ia 1419-5	W	ML	517	17.3	4	3	Nice sh, sm, sl.netted sk.
B 96-56	W	E	444	16.7	T	1	Fair skin, good shape
Ia 1442-3	W	L	496	17.3	1	3	Ex. sh, dull sk, much scab
ND 4160-Ia 2	W	ME	473	14.8	0	0	Fair wh, sk, nice sh, smooth
B 605-10	W	ME	514	16.5	2	2	Fair skin, flat, round

Iowa table 1, continued.

Ia 1441-2	W	M	509	17.5	T	2	Lt. russet, fair, sl.flat few [points
Mohawk	W	ML	501	17.3	T	3	Dull skin, sl.flat, elongate
Ia 1119-1	W	M	493	17.1	T	3	Lt.golden, nice sh, v.smooth
CS 3-Ia 3	W	ML	483	18.0	2	1	Nice skin, good sh, v.good CS [seedling
Ia 1373-1	W	L	470	18.4	T	3	Dull, much #2 sc, not attractive
TI 5	W	L	513	17.1	4	2	Long wh, sl.flat, wh. skin
Ia 1077W28-5	W	ML	383	18.4	2	2	Some pointed, wh.skin, smooth
S 3001-1	W	M	502	14.3	2	1	Shiny wh. skin, deep eyes.
ND 4252-Ia 2	R	E	446	16.2	T	1	V. sm. lt.russet red
B 3095-18	W	E	487	21.6	2	1	Lt.russet skin, some sg
3WM 19	W	E	437	13.9	T	L	Bright wh. skin, sl.slongated
Ia 1443-3	W	M	461	18.8	T	2	Nice skin, fair sh, smooth
3 RC-8	W	ML	473	20.7	T	3	Flat netted skin, smooth
Neb.93.48-1	R	ML	465	18.0	T	3	Fair red color, smooth, flat [fair skin
B 3299-13	W	ME	487	16.2	T	3	V.nice sh, fair sk, smooth
Ia 1380-1	W	ML	482	19.0	T	2	V.nice sm. russet
B 3930-Ia 3	R	M	472	17.1	1	1	V.rough, lt.red.
1488 b	W	L	398	20.1	4	3	Much #2 sc, rough, sg
Ia 1181-1	W	M	437	18.6	1	1	Nice sk, wh and smooth
Picha 51.4-53-1	R	M	463	15.6	T	2	Smooth red skin, sl.elongated
3XE-1	W	ML	465	18.2	4	2	Flat, much #2 sc,nice sk, sm.
Ia 1158-1	W	E	410	18.6	T	4	V.nice skin, sm. fair shape
Ia 5560-1	W	M	405	13.7	3	1	Sl.flat, wh.skin, v.smooth
B 2896-10	W	E	431	16.7	T	3	V.sm, nice wh.skin, much #2 sc.
CB 4739-58	W	M	366	18.6	4	1	Pointed, dull skin
La 6618-2	W	M	379	15.8	2	1	Nice sk, shiny smooth
Ia 14143-4	R	ME	417	17.5	T	3	Sm red, lt.color, fair skin
ND 2774-3	R	ME	444	16.2	4	1	Russetted red, v. unattractive
Ia 14141-4	W	M	450	18.0	1	2	Wh.skin, sl.flat, v.smooth
Minn.24	W	E	410	15.4	T	4	Nice skin, smooth, good shape
Ia 1447-1	W	M	392	15.8	2	1	Wh.skin, attractive,sl.flat
Ia 1416-3	W	L	441	19.7	T	3	Smooth, g.shape, fair skin
B 3834-44	W	E	417	17.3	3	1	Gld'n, somewhat flat
Ia 1440-1	W	M	423	16.7	4	2	Covered #2 sc, exc. shape
OB 3612-1	W	VL	430	18.2	T	4	Sg.good skin, sm, sl.deep apical [end
ND B 3627	W	M	418	17.3	2	2	V.sm, sl.netted, nice shape
B 3310-5	W	M	325	14.1	2	1	Many pointed, wh.skin
ND 457-1-10	W	VE	434	15.4	T	3	Nice skin, smooth
Ia 14147-2	R	L	349	19.2	T	3	Purplish red, pointed, sm.skin
Ia 1027-1	R	VE	397	16.2	4	1	Lt.red, sm, fair skin
Ia 14129 -1	W	ML	404	15.8	T	3	Dull skin, smooth
3XX-1	W	ML	392	15.0	4	2	V.flat, fair skin
Ia 1422-2	W	ME	375	16.0	T	3	Dull, semi-russet sk, round,nice [shape
B 3672-3	W	L	393	19.2	T	2	Flat, pointed
La 6620-1	R	ML	412	17.1	T	2	Fair red color, deep apical end
Ia 1084-1	R	E	393	16.5	T	1	Nice shiny lt.red skin, smooth

Iowa table 1, continued.

Neb. 82.49-1X	R	L	381	19.0	3	2	Smooth, l.red,poor color,rus.red
Ia 898-1	W	ML	404	14.3	T	3	Attrac, netted skin, smooth
Ia 1467-1	W	M	379	19.0	0	0	V.nice sk, flat, smooth
Ia 1416-1	W	L	387	21.2	2	3	Netted skin, not att've, sm.
Neb. 215-50-2R	R	L	405	17.5	4	3	Nice long red, sm, very scabby
La 6618-1	W	E	397	17.3	T	1	Nice sh, v.sm, nice skin
ND 2853-3	R	L	346	17.5	T	2	Dark russet red
Minn 3-7-6	Rus	ME	371	16.9	T	4	Alligator skin, very smooth
ND 3974-Ia 1	W	M	269	18.0	0	0	Golden, skin, small size, sm.
Ia 1410-2	W	M	359	17.5	T	2	Poor skin, smooth
B 3452-15	R	ME	350	16.2	T	3	Lt.red, fair skin, good sh.
Ia 1415-2	W	ME	341	16.9	T	3	Much #2 sc, russet, g'd'n, small
Neb 83.49-1	R	E	280	17.1	4	2	Rus, red, sm, good color
Ia 1403-1	W	ML	362	17.5	4	2	Much #2 sc, sl.flat, smooth
Ia 1402-5	W	M	329	18.4	T	2	Small, sl.russet, deep apical [end
Ia 1412-1	W	E	194	14.3	T	2	Nice shiny skin, smooth
OB 2905-1	W	L	371	15.6	3	2	Dull skin, fair shape
Ia 894-1	W	M	348	13.9	T	3	Russet, v.smooth, fair shape
Ia 1411-1	W	M	273	14.8	T	3	Lt. gld'n, smooth
B 3428-11	W	ME	325	17.3	1	3	Fair shape
Ia 8167-1	W	M	374	18.0	T	3	Nice shaped russet
Picha 51-1-53-13	R	ML	298	16.9	3	2	Br.red, sm, many gc, elongated
Ia 872-4	W	ML	361	16.9	T	2	Exc. shape, nice skin
Ia 1402-4	W	M	307	19.9	2	1	Lt. gld'n skin, nice, small
CS 15-Ia 2	W	M	212	18.0	2	1	Small, golden
B 3319-30	W	M	262	16.7	1	2	Nice skin, many points
Ia 1405-1	W	E	323	16.0	4	2	Elongate, dull skin
B 24-58	W	L	293	19.9	T	4	Small, dull skin, sl. flat.
Ia 894.2	W	M	231	18.0	2	2	Many pointed, dull skin
Saranac	W	L	280	16.7	4	2	Dull skin, heavy netted, sq.
Ia 5583-1	W	ME	295	14.8	2	2	Poor yield, fair sk, sl.netted, [fairly smooth
CS 1 Ia 2	W	E	312	17.7	0	0	Gld'n skin, small, smooth
Ia 5583-5	W	VE	299	15.4	T	3	Small, fair skin, smooth
B 3576-22	W	ME	215	16.0	2	1	some sg, wh. skin, small, sm.
Ia 1402-3	W	L	302	18.0	1	3	GC, dull sk, g.sh, smooth
Mich 139.9	W	E	303	15.0	4	2	Sl.pointed, dull unattr.skin
1682-C	W	M	259	17.3	T	3	GC, sm, netted skin, fair sh.
B 3556-12	W	ML	167	18.4	T	3	Fair sk, some sq,points fair sk.
Norgleam	W	VE	306	16.5	T	3	Smooth, fair skin
Pentland Ace	W	ME	271	17.5	T	3	Long wh, smooth, netted skin
Ia 1419-6	W	E	162	18.2	T	4	Pointed, fl, sl.netted skin
Ia 14151-1	W	M	386	16.9	T	3	Gld'n skin, sm, sl.flat
B 3309-2	R	ML	270	14.3	T	3	Lt.red, many gc
Ia 1401-1	W	M	273	17.3	T	3	Beaut. long wh, very smooth
Ia 1379-1	W	ML	301	17.7			
OB 3596-1	W	VL	278	15.0	2	3	Fair skin, sl.flat, deep eyes
Picha 50.4-52-40	R	E	246	14.3	T	4	Dark russet red
CS 20-Ia	W	VE	206	17.1	2	2	Golden, flat

Iowa table 1, continued.

Ia 8167-1	W	M	255	17.7	3	1	Nice rus, good sh, sm, attrac.
B 3598-20	W	E	246	14.5	1	3	Sl. flat, smooth, nice skin
Ia 1327-1	R	L	244	18.8	T	3	Rough, lt.red, netted skin
Ac 25953	W	L	193	19.4	T	2	Golden skin, nice rn'd shape
Wis 0112.51	W	ME	209	17.1	4	2	Dull, semi-rus't, smooth
Ia 1419-4	W	L	178	17.3	3	2	Pointed, fair skin
Hindenberg	W	L	205	20.5	T	1	Golden skin, smooth
Ia 911-7	W	M	191	19.9	T	1	Golden skin, smooth
DXD-3	W	L	168	18.2	T	4	Wh.sk, pointed, long white
Ia 1369-2	W	E	191	17.3	4	1	Dark Gld'n color, sl.flat, sm.
Ia 1443-4	W	VL	192	19.0	T	4	Wh.sk, netted skin, smooth
Ia 1114-2	Rus	L	196	18.2	0	0	Nice russet, sl. flat.
Ia 1419-7	W	E	31	17.5	T	2	Very poor, pointed
Ia 1444-1	W	L	102	19.0	T	3	Long wh, heavy netted or sl.rus.
Ia 1445-1	R	M	43	15.6	0	0	Very rough and small, discard

Iowa table 2. Early yield test, Clear Lake, 1958.

Variety	Color	Mat.	U.S.No.1 per acre Bu.	Total* solids Pct.	Scab A	Scab T	Remarks
Cobbler	W	ML	638	17.1	T	4	White skin
Tawa	W	M	640	17.1	1	3	Sl.netted skin, very smooth
Ia 1037-1	W	ML	573	16.5	T	1	Dull skin, few pointed
Ia 1415-1	W	ML	571	15.2	4	2	Dull skin
Ia 1213-1	R	M	544	18.2	T	1	Shiny skin, red, sl.flat
Ia 913-2	W	M	531	15.8	T	3	White skin, fl, shiny skin
Ia 803-1	W	M	553	16.7	T	3	Shiny wh. skin, flat
Ia 1403-4	W	E	468	15.0	2	2	White skin, smooth
Norland	R	VE	420	14.5	3	2	Lt.red, sm, sl.russet
ND 2910-1	R	ML	459	17.1	4	2	Dark, russet red, very sm.
Ia 1193-1	W	ME	462	16.2	T	3	Gld'n rus, sl.flat, smooth
Ia 961-1	W	ME	450	16.2	T	1	Nice, sm, fairly wh. skin
B 3194-Ia 1	W	M	426	16.2	1	2	Wh. shiny sk, nice shape
Ia 1157-8	W	VE	268	16.5	T	2	Very nice sk, very smooth
Ia 1157-2	W	ME	173	16.2	2	2	Wh.skin, pointed, small
L.S.D. .01			171				
.05			127				

* Average 4 replications.

Source of Seed Trial. This year marks the second year for this test, which is conducted in cooperation with the Lake of the Woods Growers and Mr. S. J. Oberhauser. These tests were conducted in 1957, but no conclusions were drawn. This year careful disease readings were taken in late June to determine the exact amount of virus disease present. The statistical analysis of yields and

the incidence of virus diseases in late June coincide perfectly. It is evident that in the 1958 trials that yields are dependent upon freedom from virus diseases. Foundation and certified seed sources provide this assurance. Seed one year removed from certification may or may not be free of high incidence of virus diseases.

Iowa table 3. Late yield test, Clear Lake, 1958.

Variety	Color	Mat.	U.S.No.1 per acre	Total* solids	Scab A	Scab T	Remarks
			Bu.	Pct.			
Saco	W	ML	641	19.2	1	2	Wh.sk, shiny, rough, flat
Red Pontiac	R	L	640	15.6	T	3	Rough
B 2368-4	R	VL	603	16.9	T	1	Rough
B 3692-4	W	ML	561	17.3	2	2	Wh.sk, pointed tubers
B 3511-17	W	L	561	16.0	3	2	Sl.plot, fair sk, sl.dull
Kennebec	W	L	576	18.2	4	2	Sm, good wh.skin, sl.flat
Ia 1426-1	R	M	518	18.0	3	2	Good red color, sm, semi-shiny
Plymouth	W	ML	542	17.3	1	2	Dull skin, rough
Ia 1410-1	W	M	432	18.2	T	1	Small, dull skin
Sebago	W	L	483	16.2	T	4	Smooth, fair wh.skin, sl.flat
La 6279	R	ML	480	15.2	4	2	Fair color, deep eyes, elongate
Ia 913-3	W	ML	452	17.7	T	1	Good skin, pointed, sl.rough
Ia 1073-1	W	L	436	17.1	0	0	Gd'n skin, smooth
Cherokee	W	L	435	17.3	T	1	Shiny wh.skin, sl.flat, sl.rough
B 3584-5	W	M	435	16.0	T	2	Attra, sm, sl.net, shiny wh.sk.
Merrimack	W	VL	443	19.4	T	1	Lt.russet, rough
Ia 1111-10	W	ML	411	19.0	T	3	Shiny skin, flat
Keswick	W	L	417	18.8	3	2	Dull sk, elongate, rough
Ia 1129-4	W	ML	343	18.6	T	3	Flat, gldn russet
B 3124-Ia 3	W	L	340	17.5	1	1	Good skin, some pointed
Antigo	W	M	335	16.7	2	1	Wh. skin, sl.flat
Ia 1212-1	W	VL	266	17.1	0	0	Lt.red, sm, fair sk, few points
Ia 1019-7	W	L	255	15.8	T	1	Heavy net sk, not attrac. dull
L.S.D. .01			208				
.05			156				

* Average 4 replications

In 1958 it appeared that the Cherokee seed one year removed from certified was almost as good as Foundation or Certified in yields and freedom from virus diseases. However, this was not true of Cobbler or Pontiac where the yield of potatoes grown from seed one year removed from certification was drastically reduced and the incidence of virus diseases was relatively high (see Iowa table 4).

Scab Trial. This year included 47 entries with Cherokee and Cobbler planted as checks. Cobbler was planted side by side with each entry and consistently had deep pustules of scab (type 4 scab). Of the 47 entries, two were almost entirely free of scab i.e. Ia 1410-1 and B 4170-3. This indicates a degree of scab resistance far superior to Cherokee which is usually considered sufficiently scab resistant for most scab infested soils. The selection Ia 1410-1 is high

yielding [see Iowa Yield Trials (late)] highly late blight resistant, high in solids and slightly later than Cobbler in maturity. B 4170-3 also has resistance to verticillium wilt (see Iowa table 5).

Iowa table 4. Source of seed test, Clear Lake, 1958*.

		1957 yield per acre	Disease Incidence		Yield per plot	1958 yield per acre
			Leaf roll	Mosaic		
		Bu.	Pct.	Pct.	Lbs.	Bu.
Cobbler -	Foundation	635	0	0	47.5	426
	Certified	624	0	0	48.0	431
	1 year removed	611	18	9	24.9	274
Cherokee	Foundation	473	0	0	52.3	469
	Certified	499	0	0	53.6	480
	1 year removed	414	1	0	50.8	455
Pontiac	Foundation	865	0	0	75.3	675
	Certified	776	1	0	71.4	640
	1 year removed	585	4	5	50.4	451
L.S.D.	.05	188				31
	.01	253				42

* Seed supplied by S. J. Oberhauser and Lake of the Woods Foundation, Inc., Mr. Jack Cox, Sec'y.

Conclusions: When analyzed statistically, the Foundation and Certified sources were significantly different in yields from the seed one year removed from certification. In Cherokee there was no significant differences between Foundation, Certified, or one year removed from certification. These results are very closely related to the incidence of virus diseases as found in the plots in late June.

Other lines with scab resistance equal to or superior to Cherokee are Ia 913-3 (see Iowa Yield Trial, late), B 4105-2, B 4120-2 and B 4130-11. Some of our selections which we considered high in scab resistance over a period of years such as Ia 781-7 and Ia 8140-2 (as well as Cherokee) had type 2 scab which is a very mild scab, but is considered to indicate slightly less resistance than type 1 scab. It is quite evident that the soil in which the test was conducted had adequate amounts of scab inoculum for a good test.

Breeding for Insect Resistance. There are marked differences among potato clones in resistance to potato insects, specifically leaf hopper and flea beetles. As reported in 1957 and again this year, there is apparently an entirely different mode of resistance to the two insects. The resistance to leaf hoppers does not necessarily give resistance to flea beetles and vice versa. In summary there seems to be no association between the two types of resistances and it appears evident that the nature of resistances between these two insects is totally different. In Iowa table 6 are the readings for leaf hoppers at Clear Lake during a rather severe infestation of the insect.

Iowa table 5. Scab trials, Clear Lake, 1958.1/

Selection	Replication 1 Scab Area	Replication 1 Scab Type	Replication 2 Scab Area	Replication 2 Scab Type
Ia 781-7	T	2	T	2
Ia 803-1	1	2	2	2
Ia 874-2	T	2	T	3
Ia 894-1	missing		T	3
Ia 894-2	T	3	T	3
Ia 8140-1	1	2	T	2
Ia 911-2	T	2	T	3
Ia 913-3 2/	T	1	T	2
Ia 961-1	T	3	T	3
Ia 1019-7	T	3	1	2
Ia 1129-4	T	2	1	2
Ia 1327-1	T	3	T	3
Ia 1403-4	T	3	T	2
Ia 1410-1 3/	2	1	T	1
Ia 1411-1	1	2	T	2
Ia 5560-3	T	3	T	3
Ia 5583-1	T	3	T	3
Ia 5583-3	T	4	1	3
La. 1859	T	3	T	3
Cherokee	1	2	1	2
B 3114-67	2	2	1	3
B 3457-2	4	2	4	2
B 4075-1	2	2	T	1
B 4087-5	1	2	1	3
B 4090-1	T	2	T	2
B 4090-5	T	3	2	2
B 4093-2	missing		T	3
B 4093-7	3	2	1	2
B 4093-14	4	2	5	2
B 4093-15	T	3	T	3
B 4094-9	1	2	1	2
B 4105-2 2/	2	1	1	2
B 4116-5	T	3	T	4
B 4119-1	T	4	T	3
B 4120-2 2/	T	1	1	2
B 4128-14	T	3	T	3
B 4130-7	T	3	T	2
B 4130-11 2/	T	2	T	1
B 4132-14	2	2	T	3
B 4132-23	1	2	T	3
B 4132-25	T	2	T	3
B 4134-24	T	3	T	3
B 4134-34	T	4	T	4
B 4135-2	T	2	4	2
B 4158-5	2	2	T	1
B 4170-3 3/	T	1	T	1
B 4207-1	1	2	2	2

1/ Irish Cobbler checks were all rated as trace for area and 4 for type.
2/ Highly scab resistant (better than Cherokee)
3/ Most scab resistant

Iowa table 6. Leaf hopper resistance in potato clones, Clear Lake, 1958.

Variety	Rating 1/	Variety	Rating 1/
Cherokee	5	Merrimack	2
Green Mountain	4	Plymouth	5
Huron	1	Red LaSoda	4
Katahdin	3	Red Pontiac	4
Kennebec	3	Sebago	3
Keswick	4	White Rose	5

1/ Leaf hopper readings taken September 8 by Hibbs, Orgell and Carlson. 1, highly resistant; 2, resistant; 3, moderate resistance; 4, susceptible, and 5, very susceptible.

Resistance to the flea beetle seems to be found chiefly in clones derived from the wild species Solanum chacoense as noted in Iowa table 7.

Iowa table 7. Insect resistance in various clones of potatoes, 1958.

Progeny	Parentage	Resistance	Resistance Readings 1/ Flea beetle	Leaf hopper
Ia 894-1	1276-185 x B 67-11	Sc,lb,lr	2	-
Ia 894-2	"	Sc	-	-
Ia 1077-W28-5	Minn 113.43-1 x GQT-1	Sc, lb	4	-
Ia 1373-1	Ia 1077-12 x (X 927-3)	Sc,lb,water proof leaf	4	4
Ia 1412-4	Ia 1077 W 28-5 x Ia 902-3	Sc,lb,XI	2	5
Ia 1415-2	Ia 1077 W 28-5 x Ia 902-2	Sc, lb	3	-
Ia 1419-7	X 927-3 x Ia 1077 W 28-5	Sc,lb	4	-
Ia 14151-2	1276-185 x B 401-3	?	5	-
Ia 14156-1	Mittefruhe x tub-acaule	Sc, XI	2	4
Ia 5560-1	Ia 1077 W28-5 x Katahdin	Sc, lb	5	-
B 3124-Ia 3	B 595-76 x B 606-3	Sc, Lb, XI, AI	3	-
B 3672-3	(S. chac x Merrimack) x Cherokee	Sc, lb, vw, fb	2	5
B 3821-Ia 2	X927-3 x B 24-58	Lb,vw,lh	5	-
OB 2905-1	B 301-29 x B 355-35	Sc,lb,vw,lh	5	4
OB 3596-1	Katahdin x OB 2905-1	Sc, lb, A, net, Lh	1	2
OB 3612-1	X792-88 x B 1299-15	XI, A, vw, lh	4	2
AI 5561-1	S. chac-tub x Katahdin	Fb, lh	3	3
" -2	"	Fb, lh	2	3
" -3	"	Lh	-	-
" -4	"	Lh	2	1
" -5	"	Lh	3	1
" -6	"	Lh	2	1
" -7	"	Lh	3	1
" -8	"	Lh	3	1
" -9	"	Lh	3	2
" -10	"	Lh	3	1

continued

Iowa table 7, continued.

AI 5561-12	S. chac-tub x Katahdin	Lh	3	1
" -13	"	Lh	3	-
" -14	"	Lh	4	5
" -15	"	Lh	5	5
" -16	"	Lh	4	4
" -17	"	Lh	4	5
AI 56321-1	OB 2905-1 x B 962-32	Fb	2	2
" -2	"	Fb	1	-
" -3	"	Fb	4	1
" -4	"	Fb	4	3
AI 56326-1	OB 3596-1 x B 962-32	Fb	2	4
" -2	"	Fb	3	-
AI 56328-1	OB 3596-1 x Cherokee	Fb	2	2
" -2	"	Fb	1	2
" -3	"	Fb	3	3
AI 56330-1	" x B 2834-3	Fb	1	3
" -2	"	Fb	2	4
AI 56331-1	" x ND 457-1	Lh	1	-
" -2	"	Lh	1	3
AI 56352-1	Early Gem x OB 3596-1	Lh	-	-
" -2	"	Lh	1	5
" -3	"	Lh	1	5
S 3022-6	X 927-3 x 4N Chacoense	?	-	-
" -8	"	?	4	4

1/ Same resistance scale as Iowa table 6.

Resistance to insects is found very infrequently, perhaps occurring in only 1 percent of the entire population, according to our 1958 results as shown in Iowa table 8. Based upon observations of clonal lines and segregating populations it appears that the best sources of insect resistance are: Katahdin, OB 3596-1, and B 3131-8.

Iowa table 8. Insect resistance in segregating lines, Ankeny, 1958.

			Selected for Resistance		
Progeny	Parents	Population	Flea Beetle	Leaf Hopper	Both Insects
		No.	No.	No.	No.
Ia 8141	44-13-8 x B 606-3	32		1	
Ia 5515	Ia 801-10 x B 2938-22	9			
Ia 5569	Ia 1106-4 x B 24-58	1	1		
Ia 5585	Ia 1107-3 x B 24-58	16	1		
Ia 55159	B 595-76 x PI 194665	41			1
Ia 5681	Ia 1107-3 x Ia 1077-W28-5	65			
Ia 56140	B 579-3 x La 1859	24			
Ia 56142	B 579-3 x B 3556-12	30			
Ia 56319	OB 2905-1 x La 1859	50			
Ia 56332	OB 3596-1 x La 1859	22			1
Ia 56334	OB 3596-1 x B 2834-3	60			
Ia 56375	Osage x B 3556-12	106			1

continued

Iowa table 8, continued.

Ia 5743	Ia 1077 W 28-5 x B 3391-19	39			
Ia 5744	Ia 1077 W 28-5 x B 3556-12	214	1		
Ia 57150	B 24-58 x B 3428-41	34			1
Ia 57199	B 2759-5 x Ia 1077 W 28-5	58			
Ia 57258	B 3556-12 x B 2834-3	26			
		856	3	1	4

Leaf Roll Resistance vs Insect Resistance. There has been some evidence that resistance to leaf roll might be tied in with resistance to insects. In order to test this ideâ in so far as leaf hoppers and flea beetles are concerned, 21 clones of potatoes reported to be leaf roll resistant were planted and readings taken for resistance to these two insects. It can be seen by studying Iowa table 9 that there does not seem to be any close relationship, although it is evident that the high proportion of insect resistance found is far greater than would be found in a random population. Three of the leaf roll resistant clones were also highly insect resistant, i.e. MA 434-3, MA 434-4, and B 3646-11.

Since aphids are instrumental as a primary vector of leaf roll, resistance to these insects should be studied.

Iowa table 9. Relationship of leaf hopper and flea beetle resistance to resistance to leaf roll (21 clones).

			Resistance Reading	
Pedigree	Parentage	Disease Resistance	Flea beetle 1/	Leaf hopper 2/
MA 434-3	B 2759-5 x B 986-7	Lr	1	2
-4	"	Lr	2	2
MA 437-2	" x Aquila	Lr	3	3
MI 1419-1	X 927-3 x Ia 1077 W28-5	Lr	4	5
-4	"	Xi, Lr	4	3
-8	"	Xi, Lr	3	5
B 24-58	Imperia x Earlaine	Lr	3	-
B 24-76	"	Lr	5	-
B 294-29	Houma x (X 96-56)	Lr	3	-
B 936-12	X 792-94 x B 294-38	Xi, Lr	2	5
B 3095-18	Houma x Triumf	Lr	3	-
B 3299-13	B 936-12 x Katahdin	Lb, Xi, Ai, Lr	4	-
B 3391-19	B 859-16 x B 24-58	Xi, Ai, Lr	5	-
B 3556-12	B 595-76 x B 24-58	Sc, Lb, Xi, Lr	5	5
B 3646-11	B 595-76 x B 2395-14	Sc, Lb, Y, A, Lr	1	-
B 3813-30	B 24-58 x 3VW-9	Lr	4	-
B 3817-27	B 779-1 x B 24-56	Lr	3	4
B 3835-3	ND 457-1 x B 2359-84	Lr, Ai	3	3
B 4100-8	B 792-88 x B 2359-84	Xi, Lr	4	5
B 4116-2	B 2359-84 x B 2834-3	Sc, Lr	3	-
B 4128-14	B 2962-6 x B 2969-15	Sc, Lb, Lr	2	5

1/ Readings at Ankeny, July 31, 1958; Scale same as Iowa table 6.

2/ Readings at Clear Lake, September 8, 1958. Some clones were already dead at this date and no reading was possible.

Norland and Its Performance. To satisfy the demand among many growers in the Midwest for an early red with scab resistance, the new variety Norland has been recommended. It is very early, with a season of maturity which places it with Warba, and has a fair amount of scab resistance. In color and scab resistance it is superior to Waseca. Its main defects are that it has lower solids than is desirable and its color is not as deep a red as most people would like. Yields are fair for a first early. See Iowa table 10. for yields, solids, and scab resistance of this variety at Clear Lake, and in the 10 North Central States for 1956, 1957, and 1958. Norland is recommended in the Midwest as a replacement for Warba and Waseca.

Progeny Tests. This is a fundamental study to investigate new methods of breeding in potatoes, and is composed of two major phases. The first phase includes progeny testing present potato clones to determine high combining ability for yields. This is standard practice for many crops but not for potatoes. After finding such clones with high combining ability we hope to fix this character by inbreeding. The net result will be an inbred which will enable us to get good varieties without growing such large populations of seedlings as at present. We are searching for more efficient methods of potato breeding.

The other phase consists of attempting to isolate potato haploids (plants with only one-half their usual genetic make up) and to use these plants for genetic studies of characters such as scab resistance, skin color, high solids, and similar characters. The inheritance becomes as simplified as in corn. It may even be possible to do breeding work on the haploid level.

Iowa table 10. Yields, total solids, and scab reaction of variety Norland, 1956-1958.

Variety	Yield Per Acre			Total Solids			Scab Reaction		
	1956	1957	1958	1956	1957	1958	1956	1957	1958
	Bu.	Bu.	Bu.	Pct.	Pct.	Pct.	A-T	A-T	A-T
Clear Lake, Iowa									
Norland	451	431	316	15.0	14.5	13.7	3-2	T-3	1-3
I. Cobbler	634	764	458	17.3	17.5	16.0	1-4	T-4	T-4
Triumph	363	477	460	15.4	14.3	14.1	2-4	T-4	T-3
Red Pontiac	718	611	834	15.6	13.7	14.1	1-4	T-4	T-4
10 North Central States									
Norland	392	389		16.8	16.9				
I. Cobbler	362	398		18.4	18.9				
Triumph	409	349		17.3	17.2				
Red Pontiac	540	509		17.4	17.0				

KENTUCKY

D. J. Cotter

The potato yields and specific gravity readings are presented in Kentucky table 1. Merrimack and Plymouth had the best overall rating followed by Katahdin. X 1276-185 had a high yield of nice appearing tubers, but its specific gravity reading was too low.

Kentucky table 1. Potato variety test at Lexington, Kentucky, 1958.

Variety	Yield per acre US#1	Yield per acre B Size	Yield per acre Culls	Total solids	Notes*
	Cwt.	Cwt.	Cwt.	Pct.	
Delus	150	30	35	19.7	Smooth, bright skin, flat tuber, slight second growth (test again)
Irish Cobbler	191	65	52	16.9	Rough, second growth, B size high, (test again)
Katahdin	251	42	5	15.3	Smooth, bright skin, little second growth, (test again)
Merrimack	196	54	7	18.4	No second growth, smooth shallow eyes (recommend.)
Onaway	253	36	33	14.5	Medium second growth, rough tubers, may be poor dry year (test again)
Plymouth	224	38	30	16.7	Skin russetted, slight second growth, tendency to small tubers (recommend)
X 1276-185	270	71	5	13.2	Flat shallow eyes, slight russet, no second growth, poor quality, (test again)
La 1859	291	68	102	18.0	Medium size, deep eyes, slight second growth (test again)
B 2368-13	260	125	50	16.0	Red, extensive second growth, field sprouting, rough (drop)
B 3299-13	224	45	57	17.5	Same as B 2368-13
B 3391-2	110	35	19	15.3	Slight second growth, B size, high rough (like Cobbler) (drop)
B 137-5	101	29	8	15.7	Little second growth, pointed tubers, skin rough, tuber rough (drop)
B 73-3	40	38	48	15.3	High second growth, yield low (drop)
B 605-10	225	58	12	16.0	Rot growth crack, flat, rough russet tubers (drop)
B 991-3	150	40	5	16.7	Good appearance, few B size second growth yield medium (test again)
LSD .05	32.9	4.6	7.1	0.011	
LSD .01	44.0	6.2	9.6	0.015	

* Each note is ended by a conclusion of: recommend (looks good enough to put on variety list this year) test again (need more information for a decision (drop) poor enough this year to discontinue.

Crop Notes

Planted: April 19; Harvested: August 27; Experimental design: randomized block with 4 replications; Plot size: 25 feet x 3 feet = 1/581 acre; Plant spacing: 1 seed every 11 inches; Fertilizer: 1,000 pounds of 5-10-10 broadcast at planting, side-dressed with 400 pounds of 11-20-10.

The spring season in Kentucky was 2 to 3 weeks late, due to weather conditions followed by a 3 to 4 week dry period in June. An extremely wet period in July promoted good yields. However, there did seem to be quite a lot of second growth.

LOUISIANA

Julian C. Miller

The Louisiana Irish potato breeding program continued in 1958 toward its main objectives of the production of early, red and white, blight and scab resistant selections of high quality and yield. The program has concentrated as in the past on breeding, seedling selection, yield trials, storage tests, physiological studies and tuber processing tests. Also, considerable effort has been made in crossing *Solanum acaule* with *Solanum tuberosum* in order to obtain frost resistance. Three years out of 5 Louisiana growers experience damage to some degree from frost, and, therefore, it is felt that an effort should be made to breed varieties which show tolerance to frost damage. Under Louisiana conditions *Solanum acaule* has withstood temperatures as low as 25°F. without serious damage. We now have selections in the F_4.

Crosses were made in 1958 in order to obtain the above objectives, and a satisfactory set of seed was obtained. Around 15,000 seedlings from 31 parental combinations were grown in the greenhouse late in 1957. From these 2,023 individual tubers were selected for planting in South Dakota in May, 1958. From this number 116 individual clones were selected for further study. In Louisiana table 1 are shown the parental combinations and the number of individual selections that were saved from each cross or self.

Louisiana table 1. Irish potato seedlings selected in South Dakota, 1958.

Parentage	Number of selections	Parentage	Number of selections
22-194 x 92-23	4	Cherokee x MSS 3-1	4
92-167 x 92-23	2	627-164 x B 3410-27	12
C 125-42 x B 381-2	5	Yampa x 62-164	5
C 11751 x B 627-169	2	C 10999 x C 15419	4
2644-1 x 92-23	1	6519 x	4
B 2067-1 x 2337-1	4	Pungo x Katahdin	27
Rushmore x 91-78	1	MSS 4-2 x 22-153	14
22-153 x	15	B 381-2 x C 12623	5
B 2067-1 x C 15419	2	MSS x Cherokee	2
1859 x 2368-4	3	MSS 3-1 x 1859	1

As can be seen from the tables giving the yield records, the year 1958 was not nearly as good for production of potatoes in Louisiana as was 1957, which was probably the best in the past 30 years. Heavy rains at planting time delayed plantings too late to obtain satisfactory yields. It will be brought out here that all yields were based on plots 40 feet long with rows 4 feet apart and plants spaced 12 inches apart in the row. The plots were fertilized at the rate of 800 pounds of 5-10-5 per acre and top dressed with 200 pounds of nitrate of soda applied at the time of emergence.

Red LaSoda ranks 7th among all varieties of seed certified in the United States. There was an increase in acreage of approximately 1,000 acres over 1957. In addition to its yielding ability, this variety is suitable both for the northern production areas as well as for the early crop in the South.

Selection Trials

As can be seen from Louisiana table 2, 37 1957 seedlings were saved. It will also be noted that potatoes having high solids can be produced in the South. For example, seedling 71-68 had 1.089 specific gravity and 21.8 percent dry matter. It was significantly higher than any of the standard varieties (Louisiana table 7) and as can be seen further from Louisiana table 2, many of the other 1957 seedlings were as high or higher than the standard varieties. Although many of them appear to be very outstanding, they need further evaluation.

Louisiana table 2. Data on 1957 seedlings selected in South Dakota and tested in Louisiana, 1958.

Seedling	Parentage	Vigor rating*	Late blight**	Total solids	Dry matter
					Pct.
71-3-1	MSS 4-2 x 22-153	3	?	1.062	16.0
72-6-3	MSS 4-2 x 22-153	2	+	1.060	15.7
72-19	92-167 x 92-23	2	-	1.060	15.7
72-20	92-167 x 92-23	2	?	1.061	15.9
72-21	92-167 x 92-23	2	+	1.062	16.0
72-24	92-167 x 92-23	2	?	1.062	16.0
72-25	92-167 x 92-23	2	+	1.068	17.3
72-27	92-167 x 92-23	3	+	1.052	15.1
72-28	92-167 x 92-23	2	?	1.061	15.9
72-30	92-167 x 92-23	3	+	1.057	15.6
72-35	92-167 x 92-23	2	+	1.064	16.5
72-36	92-167 x 92-23	1	+	1.061	15.9
72-37	12-91 x 92-23	3	?	1.060	15.7
72-38	12-91 x 92-23	2	?	1.056	15.3
72-39	12-91 x 92-23	3	?	1.059	15.7
72-46	Cherokee x 31-86	3	+	-	-
72-49	22-194 x 92-23	1	?	1.066	16.8
72-50	22-194 x 92-23	2	?	1.065	16.6
72-55	92-167 x 92-23	3	-	1.063	16.3
72-59	92-167 x 92-23	3	+	1.061	15.9
72-60	92-167 x 92-23	3	?	1.063	16.3
72-62	92-167 x 92-23	2	+	1.059	15.7
72-65	92-167 x 92-23	3	+	1.059	15.7
72-66	92-167 x 92-23	2	+	1.067	17.1
71-68	Falke x Gineke	3	?	1.089	21.8
71-71	22-153 O.P.	3	?	1.068	17.3
72-96	92-167 x 92-23	1	?	1.069	17.6
72-100	92-167 x 92-23	3	?	1.057	15.6
72-101	92-167 x 92-23	2	?	1.063	16.3
72-106	92-167 x 92-23	2	?	1.071	17.8
72-111	12-92 x 22-194	2	?	1.057	15.6
72-122	226 x Gineke	3	?	1.075	18.8
72-123	226 x Gineke	3	?	1.071	17.8
71-148	Bona x Furore	2	?	1.062	16.1
71-160	595-76 x B 3131-8	3	?	1.074	18.7
73-78-12	MSS 4-2 x 22-153	3	?	1.073	18.5
MSS 3-1	*S. acaule*	4	?	1.071	17.8

*Plant vigor ratings taken 60 days after planting: 1, very vigorous; 2, vigorous; 3, intermediate; 4, weak; 5, very weak.

** The blight readings were made under controlled conditions in a disease chamber: +, blight; -, no blight; ?, reading not definite.

The data on the 1956 seedlings are presented in Louisiana table 3. Seedling 61-125, which is a very early, high yielding, white skinned potato, had a specific gravity of 1.071 and dry matter of 18.0 percent. Seedling 62-162 continued to look promising; however, we found one definite defect in that it air cracks at harvest time in the fall planting. It is very good as a breeder as it shows a high degree of resistance to late blight. Seedling 62-22 also looks very promising. It is high yielding and an oblong potato.

Louisiana table 3. Data on 1956 seedlings selected in South Dakota and tested in Louisiana, 1958.

Seedling	Parentage	Vigor rating*	Late blight**	Yld/acre No. 1's	Total solids	Dry matter
				Bu.		Pct.
62-18	LaSoda x 12-92	3	+	214.5	1.061	15.6
62-22	LaSoda x 12-92	2	+	245.4	1.050	15.0
61-45	LaSoda x 92-23	2	+	83.9	1.067	17.0
62-53	LaSoda x 92-23	2	+	86.7	-	-
61-55	LaSoda x 92-23	5+	+	69.7	1.050	15.0
61-67	Red LaSoda x 92-23	3	+	109.7	1.050	15.0
62-74	LaSoda x 1859	2	+	134.8	-	-
61-81	Cherokee x DeSoto	2	+	162.1	1.060	15.6
62-91	Triumph x 92-23	4	+	140.9	-	-
61-103	Triumph x 1859	-	+	127.9	1.059	15.1
61-125	92-167 x 12-25	-	+	233.3	1.071	18.0
62-162	92-127 x 12-92	1	-	135.8	1.065	16.6
61-193	1859 x Nebr. 26.44-1	3	+	118.8	1.050	15.0
61-195	1859 x Nebr. 26.44-1	3	+	94.8	1.061	15.6

*Plant vigor ratings taken 60 days after planting: 1, very vigorous; 2, vigorous; 3, intermediate; 4, weak; 5, very weak.

**This field reading was taken at Plaquemines Parish Experiment Station: +,blight; -, no blight.

Of the advanced seedlings (Louisiana table 4) as compared with the standard varieties Red LaSoda, Sebago and Katahdin, seedling 42-45 was very promising along with 62-162, 91-78 and 91-143. It will be noted that the last 3 show a high degree of resistance to blight and in previous years all four of the seedlings mentioned have shown some resistance to scab. The remaining seedlings listed in this table are kept primarily for breeding as they carry a number of important genes particularly for red color and vigor.

Louisiana table 5 shows the yields of Red LaSoda and the advanced seedlings compared with other standard varieties over a 5-year period. While 91-78 and 91-143 produced satisfactory yields as compared to Sebago, they do not yield quite as high as Katahdin. Although the Red LaSoda produced yields significantly higher than all varieties, another outstanding red seedling, 42-45, on a 2-year basis has outyielded Red LaSoda. This seedling closely resembles Red LaSoda, but sets more potatoes per hill and shows more resistance to scab.

Louisiana table 4. Irish potato variety and advanced seedling tests at different locations in Louisiana, 1958.

Variety or seedling	Late blight*	Vigor rating**	Yield of No. 1's per acre					
			New Roads	Donald-s'ville	Diamond	Chase	Calhoun	Ave.
			Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Red LaSoda	+	2	115.4	87.1	83.8	230.6	141.1	131.6
Sebago	+	3	79.4	32.8	66.8	88.0	94.6	72.3
Katahdin	+	3	155.6	90.6	86.6	154.7	127.8	123.1
42-45	+	3	188.8	115.7	117.9	208.9	110.4	148.3
52-23	+	3	92.9	-	65.5	-	60.6	73.0
52-38	+	2	61.2	-	-	-	-	61.2
52-39	+	3	70.5	-	58.6	-	-	64.6
62-162	-	1	135.8	-	88.8	-	-	112.3
91-78	-	3	134.1	62.2	68.3	-	-	88.2
91-143	-	2	109.2	51.5	39.0	87.2	73.8	72.1

*The blight readings were taken in a moist chamber under controlled conditions: +, blight; -, no blight.

**Plant vigor ratings taken 60 days after planting: 1, very vigorous; 2, vigorous; 3, intermediate; 4, weak; 5, very weak.

Louisiana table 5. Yields of Red LaSoda and advanced seedlings compared to yields of other standard varieties over a 5-year period, Louisiana, 1958.

Variety or seedling	Yield of No. 1's per acre					
	Year					
	1954*	1955*	1956*	1957*	1958**	Average
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Red LaSoda	203.3	110.3	281.7	414.8	144.9	231.0
Triumph	165.7	81.2	100.7	183.7	189.0	144.1
Katahdin	216.1	121.6	203.8	297.4	155.6	198.9
Sebago	177.0	29.5	201.9	253.3	79.4	148.2
Rushmore	160.5	78.7	79.1	105.1	144.1	113.5
42-45	-	-	-	418.1	188.8	303.5
91-78	161.0	92.0	167.3	235.1	134.1	157.9
91-143	149.2	118.4	173.4	191.8	109.2	148.4

*Yields obtained from Baton Rouge.

**Yields obtained from New Roads.

Resistance to Late Blight

Field readings are listed in Louisiana tables 2, 3 and 4. Of the 37 1957 seedlings included in Louisiana table 2, 2 red seedlings, 72-19 and 72-55, showed resistance to blight; however, definite readings could not be made on many of them.

As was brought out earlier in this report, seedlings 62-162, 91-78 and 91-143 show a high degree of resistance to blight.

Test on Resistance to Common Scab

A test on the resistance to common scab (Streptomyces scabies) of all the seedlings in the Irish potato development project was carried out at the Plaquemines Parish Experiment Station at Diamond, Louisiana. The resistance of the check varieties and seedlings to scab is shown in Louisiana table 6. In the depth of lesion column, 1 indicates few and very shallow lesions and 2 indicates a few more lesions than appeared on those rated as 1. Ratings from 3 to 5 indicate susceptibility and the seedlings that were given such ratings are not listed. All seedlings listed would be considered as having a high degree of scab resistance.

Louisiana table 6. Resistance of seedlings and check varieties to scab, Plaquemines Parish Experiment Station, Diamond, Louisiana, 1958.

Variety or seedling	Depth of lesions*	Variety or seedling	Depth of lesions*
LaSoda	3	72-21	2
Red LaSoda	3	72-25	2
Triumph	3	72-28	2
Rushmore	3	72-35	2
LaSalle	4	72-36	1
Cherokee	trace	72-38	2
52-38	2	72-49	1
62-162	1	72-50	2
61-81	2	72-62	2
62-74	2	72-66	2
61-45	2	72-96	1
62-22	2	72-101	2
72-6-3	2	72-106	2
72-19	2	72-111	2
72-20	2	71-148	2

*Rating from 1 to 5: 1, very shallow lesions and 5, very deep lesions.

Quality Studies

The data on quality studies are presented in Louisiana table 7 and show vitamin C, specific gravity, dry matter, chip rating and reducing sugars of some of the standard varieties and advanced seedlings. It is well to call attention to 91-78 which again had the highest rating from the standpoint of chipping. Seedlings 91-143 and 52-23 were rated along with Sebago.

Pollen Studies

A search has been conducted in the Department of Horticultural Research during the past 4 years for a reliable check on pollen potency of Irish potato and other horticultural crops to replace the unreliable germination and the meaningless aceto-carmine type of test. One test has been developed thus far which shows promise of consistently giving that which is considered an indication of total viability in a batch of Irish potato pollen at any particular time.

This test is based on the peroxidase reaction. Irish potato pollen is applied to a special agar-type medium, and the peroxidase reaction in the pollen grain begins immediately thereafter. Those grains considered viable swell and appear as giant, nearly colorless grains. Nonfuctional grains do not swell. Instead, they become blue in color. Aborted grains can be distinguished by their characteristic structure.

Louisiana table 7. Quality studies of several potato varieties and advanced seedlings.

Variety or seedling	Vitamin C mgs/100 gms	Specific gravity*	Dry matter Pct.	Chip color rating**	Total reducing sugar mgs/100 gms Pct.
Red LaSoda	21.2	1.061	15.9	3	.60
Katahdin	21.2	1.064	16.5	6	1.00
Rushmore	16.4	1.067	16.7	8	1.48
Pontiac	13.2	1.060	15.2	3	.30
Triumph	23.2	1.062	16.1	3	1.00
White Rose	12.2	1.060	15.7	3	0.00
Sebago	12.2	1.060	15.9	8	0.00
42-45	13.4	1.060	15.8	3	.30
52-23	28.2	1.065	16.6	8	.30
52-38	9.6	1.060	15.8	5	0.00
52-39	12.0	1.066	17.0	3	0.00
62-162	17.2	1.058	15.7	5	0.00
91-78	22.8	1.067	17.1	9	.60
91-143	17.0	1.065	16.6	8	.30

*Louisiana fall-grown potatoes.

** 0, repulsive; 1, very poor; 2, poor; 3, poorly fair; 4, fair; 5, acceptable; 6, fairly good; 7, good; 8, very good; 9, excellent; 10 ideal.

MAINE

Reiner Bonde, R. V. Akeley and D. Merriam

Comparison of Yield Rates of Ring-Rot-Resistant Seedlings of Commercial Varieties

A number of promising ring-rot-resistant seedlings are compared each year in Maine with the standard commercial varieties regarding their ability to produce good yields of marketable potatoes.

The potatoes were grown in replicated plots on Caribou Loam soil and received the standard fertilizer and cultural treatments used in Aroostook County, Maine. Bonde table 1 compares the yield for 15 seedlings and 5 varieties grown in 1958. The data show that 9 of the seedling selections were in the same yield group as the varieties Green Mountain, Katahdin, Kennebec and Teton. The mean yields of the last five seedlings listed in Bonde table 1 and Merrimack were inferior to those of the above 4 varieties, and seedlings B 3478-45 and B 3478-58.

All of the seedlings included in the test have attractive tubers and desirable foliage and cultural characteristics. Preliminary tests show that they also possess good cooking qualities.

Bonde table 1. Comparison of yields for ring-rot-resistant seedlings and commercial varieties.

Variety or Selection	Yield per acre 1/ Bu.	Yield per acre 1/ Cwt.	Stat. Sig. 2/
B 3478-45	676	406	a
B 3478-50	668	401	a
Kennebec	661	397	a
Green Mountain	660	396	a
Teton	658	395	a b
Katahdin	654	392	a b
B 3354-18	646	387	a b c
B 3566-1	644	386	a b c
B 2900-37	631	379	a b c d
B 3201-38	625	375	a b c d
B 3400-1	616	370	a b c d
B 911-21	610	366	a b c d
B 725-32	594	357	a b c d
B 3352-15	570	342	b c d
B 3391-2	565	339	c d
B 2855-5	561	336	c d
B 3095-18	556	333	d
B 3397-17	550	330	d e
Merrimack	503	302	e
B 3102-3	433	260	e
L.S.D. .05	73	44	
" .01	97	58	

1/ Average of 5 replicated 25-foot rows for each variety or selection.

2/ Means followed by the same letter or letters are not significantly different at .05 percent level according to Duncan's Range Test.

MAINE

Hugh J. Murphy, Allen E. Schark and Michael Goven

Cooperative variety trials were conducted in Maine in 1956 at Presque Isle, Fort Kent, Exeter, and Rumford Point. The parentage and main characters of the varieties and seedlings tested are given in Murphy table 1. The results for yields and total solids are presented in Murphy table 2 and percentages of U. S. No. 1 and Maine U. S. No. 1 (size A) are presented in Murphy table 3.

B 2368-4, Saco, Kennebec, Boone, 50B9-8, and B 605-10 yielded well at all locations. B 73-3, Saco, and Kennebec were reasonably high in total solids even though the 1958 growing season was not favorable for the production of high dry-matter tubers in Maine.

Results of chipping and french fry studies are given in Murphy tables 4 and 5. All varieties produced darker colored chips than the same varieties in 1957. Chips made from the varieties grown at all locations except Presque Isle were all of unacceptable color. A few of the varieties grown at Presque Isle such as Katahdin, Cobbler, Rushmore, Plymouth, B 73-3 and Dazoc would probably be considered as acceptable for chipping purposes.

Results of a variety trial conducted for the Campbell Soup Company, Riverton, New Jersey are given in Murphy table 6. Since many of the entrees were grown in Maine for the first time no conclusions were made relative to their possibility for Maine conditions.

Murphy table 1. Parentage and characters of varieties and seedlings in yield trials, Maine, 1958.

Variety	Parentage	Maturity	Skin color	Disease resistance and notes 1/
Boone	TI-5 x B 231-3	VL	W	Lb, n.nec.
Dazoc	Triumph x Neb. 49.40-3	E	R	None
Cobbler		E	W	Virus A
Katahdin	40568 x 24642	L	W	Virus A, l.r.,n.nec.
Kennebec	B 127 x 96-56	M	W	Lb, virus A, n.nec.
Plymouth	Mohawk x 96-56	E	W	Lb, sc, n.nec.
Redburt	Selection from Satapa	E	R	None
Rushmore	Katahdin x Gr. Mountain	E	W	None
Russet Burbank		L	Rus	Sc.
Russet Rural		L	Rus	Sc.
Russet Sebago	Selection from Sebago	L	Rus	Sc, lb, yellow dwarf,Vir.A
Saco	41956 x 96-56	M	W	Lb, vir.A,&X, n.nec.
50B9-8	Teton x B 446-58	M	W	Lb,virus Y.
B 1339-12	B 244-16 selfed	L	W	Lr.
B 137-5	Sequoia x 47562	E	W	None
B 2187-25	1276-185 x B 522-33	M	W	Sc,lr,vert.wilt.
B 2368-4	Pontiac x B 400-1	L	R	Sc.
B 3391-2	B 859-10 x B 24-58	M	W	Lr.
B 3400-1	B 24-58 x B 922-3	E	yel	Lr.
B 605-10	Pungo x 96-56	E	W	Lb, sc.
B 73-3	Mohawk x 96-56	M	W	Sc.

1/ Late blight resistance is to the common race of the organism. Net necrosis is a tuber necrosis caused by current-season infection with leaf roll virus.

Murphy table 2. Yield and total solids content of potato varieties grown at 4 locations in Maine, 1958.

Variety	Presque Isle		Exeter		Rumford Point		Fort Kent	
	Yield /acre	Total solids	Yield /acre	Total solids	Yield /acre	Total solids	Yield /acre	Total solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
B 2368-4	497	18.53	434	18.95	388	18.32	379	17.05
Saco1/	470	19.79	394	21.27			386	17.47
Kennebec	469	19.58	362	20.00	349	19.16	395	17.05
Katahdin	411	18.95	283	19.58	307	18.32	296	17.05
Boone	410	17.89	354	18.32	356	16.42	315	15.78
B 605-10	403	18.10	248	19.16	277	18.53	388	17.26
50B9-8	401	15.99	406	17.89	238	15.99	368	14.31
Russet Sebago	400	18.74	324	19.37	264	18.53	273	16.63
B 137-5	399	17.47						
Cobbler	399	19.37	287	20.64	310	19.58	368	18.53
Redburt	392	17.47	290	17.89	317	17.05	398	16.63
B 2187-25	387	18.74	245	19.37	335	18.32	304	16.63
Rushmore	386	17.47	184	18.10	299	17.26	356	16.84
Russet Rural	385	20.21	390	20.43	319	19.58	303	18.10
Plymouth	383	18.74	267	19.37	296	18.10	312	17.05
B 73-3	372	20.43	300	21.06	298	19.16	325	18.53
Dazoc	365	17.26	215	18.74	260	17.26	346	17.05
Russet Burbank1/	339	19.79	326	20.64	340	19.16	301	17.28
B 1339-12	337	21.27						
B 3400-1			155	18.10	184	17.47	292	16.42
B 3391-2			281	18.95	293	20.64	290	19.58
L.S.D. .05	44	0.63	48	0.63	73	1.05	52	0.63
L.S.D. .01	60	0.84	64	0.84	94	1.47	68	0.84

1/ Seedpieces of the Saco were spaced 10 inches apart; Russet Burbank 16 inches; all others 8 inches.

	P. I.	Exeter	R. Point	Ft. Kent
Planted	May 19	May 6	May 24	May 21
Killed	Sept. 11	Sept. 10	Sept. 10	Sept. 3
Harvested	Sept. 18	Oct. 10	Oct. 13	Oct. 6
Fertilizer Lbs/a.	110-165-165	120-180-180	160-240-240	150-225-225

Murphy table 3. Percentage of yield between 1 7/8 and 4 inches in size for potato varieties grown at 4 locations in Maine, 1958.

	Presque Isle		Fort Kent		Rumford Point		Exeter	
Variety	Class [1] 1 7/8-4 inches	Class 2 1/4-4 inches	Class 1 7/8-4 inches	Class 2 1/4-4 inches	Class 1 7/8-4 inches	Class 2 1/4-4 inches	Class 1 7/8-4 inches	Class 2 1/4-4 inches
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
B 2368-4	91	88	94	88	96	90	94	87
Saco	96	90	98	89			96	90
Kennebec	96	89	97	88	97	89	96	88
Katahdin	96	87	98	84	98	91	97	87
Boone	97	89	97	83	90	84	95	86
B 605-10	96	88	98	87	97	85	97	89
50B9-8	93	85	96	84	91	84	97	87
R. Sebago	97	88	97	79	97	81	97	82
Cobbler	96	77	96	72	96	74	97	84
Redburt	96	81	97	84	94	82	98	88
B 2187-25	98	84	97	79	97	80	98	80
Rushmore	98	81	98	79	95	77	96	76
R. Rural	96	87	97	84	98	84	97	91
Plymouth	97	88	98	85	99	94	97	90
B 73-3	98	90	97	82	99	87	99	91
Dazoc	96	67	92	58	95	71	96	72
R. Burbank	51		55		44		42	
B 3400-1			96	74	97	74	97	74
B 3391-2			91	50	97	75	97	75
B 137-5	98	84						
B 1339-12	97	78						

1/ Russet Burbank sized from 4 to 10 ounces by weight.

Murphy table 4. Chip color indices for potato varieties grown at 4 locations in Maine, 1958.[1]

Variety	Presque Isle	Exeter	Rumford Point	Ft. Kent
B 2368-4	9.0	9.9	10.0	10.0
Saco	7.7	9.0		9.9
Kennebec	8.0	8.9	9.6	9.7
Katahdin	7.2	8.9	9.3	10.0
Boone	10.0	10.0	10.0	9.9
B 605-10	8.2	9.3	10.0	9.8
50B9-8	9.5	10.0	10.0	10.0
Russet Sebago	6.3	8.1	8.6	9.7
Cobbler	7.2	8.2	9.3	9.4
Redburt	8.5	9.9	9.3	10.0
B 2187-25	8.3	9.1	10.0	9.9
Rushmore	6.9	8.6	9.0	10.0
Russet Rural	8.1	9.3	9.5	9.9
Plymouth	6.7	9.3	9.4	9.9
B 73-3	6.3	8.8	9.0	9.8
Dazoc	7.4	8.3	8.9	9.9

continued

Murphy table 4, continued.

Russet Burbank	8.4	9.4	9.7	10.0
B 3400-1		9.5	9.9	10.0
B 3391-2		9.7	10.0	10.0
B 137-5	8.9			
B 1339-12	8.5			
L.S.D. .05	0.8	0.7	0.8	0.3
L.S.D. .01	1.0	0.9	1.1	0.4

1/ 1, very light; 10, very dark.

Color indices based on standard National Potato Chip Color reference chart.

Murphy table 5. French fry color and texture indices for potato varieties grown at Presque Isle, 1958.1/

Variety	Color index	Texture index
B 2368-4	7.9	1.0
50B9-8	9.3	1.5
Saco	6.0	1.0
Russet Rural	7.4	1.3
Kennebec	6.8	1.0
Boone	10.0	1.1
Russet Sebago	5.7	1.0
B 73-3	6.2	1.0
Redburt	7.2	1.0
Cobbler	7.1	1.0
Katahdin	6.7	1.0
Plymouth	7.2	2.0
B 605-10	7.4	1.0
B 2187-25	7.0	1.1
Dazoc	6.5	1.2
Rushmore	6.6	1.0
Russet Burbank	7.2	1.0
B 137-5	7.8	1.0
B 1339-12	7.6	1.4
L.S.D. .05	0.6	0.2
L.S.D. .01	0.9	0.3

1/ French fry color: 1, very light; 10, very dark.
French fry texture 1, mealy; 3, soggy.

Murphy table 6. Yield, total solids, chip and french fry indices for potato varieties grown for Campbell Soup Company at Fort Fairfield, Maine, 1958.

Variety	Yield /acre Cwt.	Total solids Pct.	Chip color index 2/	French fry color index 2/	French fry texture index 3/
Pontiac	418	15.99	9.1	8.3	1.6
Onaway	409	16.63	8.7	7.4	1.0
Ontario	400	16.42	7.1	6.5	1.4
Saco 1/	388	17.89	6.9	6.7	1.1
Kennebec	385	17.89	6.4	5.8	1.0
Cobbler	381	18.10	6.9	6.3	1.1
Pungo	378	17.47	8.2	6.8	1.0
Excel	371	17.89	9.4	8.7	1.1
Early Gem	368	16.63	7.8	7.0	1.1
Green Mountain	365	18.74	8.2	8.4	1.2
Teton	354	17.05	6.0	6.1	1.1
Boone	353	15.99	10.0	10.0	1.7
Norland	352	15.99	6.6	5.8	1.0
Plymouth	338	16.84	6.8	7.2	2.6
Delus	338	19.79	6.8	6.3	1.3
Keswick	334	17.89	7.6	6.9	1.0
Manota	332	17.05	7.8	6.3	1.1
Katahdin	320	16.84	7.0	6.2	1.0
Rushmore	319	16.42	6.1	6.4	1.1
Chippewa	311	15.78	6.8	5.7	1.1
Haig	304	16.63	5.5	6.0	1.0
Norgleam	302	16.84	6.3	5.6	1.0
Cherokee	299	17.68	6.2	6.1	1.1
Sequoia	299	16.21	9.3	8.6	1.3
Tawa	297	17.68	6.7	6.6	1.1
Nordak	292	16.63	6.1	5.2	1.1
Sebago	289	17.26	6.0	5.2	1.6
Antigo	287	16.84	4.5	4.9	1.0
White Cloud	273	17.68	6.0	6.3	1.1
Merrimack	260	18.32	6.1	5.9	1.1
L.S.D. .05	49	0.63	0.8	0.6	0.2
L.S.D. .01	65	1.05	1.0	0.8	0.3

1/ Seedpieces of Saco were spaced 10 inches apart; all others 9 inches.
2/ French fry and chip color: 1, very light; 10, very dark.
3/ French fry texture: 1, mealy; 3, soggy.

MAINE

G. W. Simpson, Reiner Bonde, F. E. Manzer, R. V. Akeley and Donald Merriam

Leafroll-Resistant Seedlings

Field testing for leafroll resistance was continued in 1958, using green peach aphids that had been held for one week on Katahdin potatoes known to have leafroll. The aphids were allowed to develop on the potato plants after transfer to the field growing seedlings in late June and early July. Relatively little increase in population occurred in 1958. It was not necessary to reduce the aphid population with parathion in August.

In 1958, 5,340 tubers from the greenhouse at Beltsville, Maryland, were planted on Aroostook Farm and tested for leafroll resistance for the first time. Thirty three crosses and 3 selfed lines were represented.

In addition to the new seedlings and those saved for retesting 61 selections from Nebraska representing 35 lines and 590 selections from Chapman representing 46 crosses were in the 1958 test.

All seedlings were read for current-season leafroll in August and those having leafroll symptoms were eliminated. Those not showing primary leafroll were saved for further testing. On this basis, 198 hills (3.7 percent of the 5,340 seedlings growing) were saved for replanting in 1959.

Healthy tubers of Green Mountain, Katahdin, Chippewa and Kennebec were planted systematically among the seedlings and the resulting plants were infested at the same time as the seedlings were infested with viruliferous green peach aphids. All of the plants growing from these healthy tubers showed symptoms of primary leafroll in August.

Results since the 1955 introductions are shown in Maine tables 1 through 6.

Maine table 1. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years, 1955-1958.

Pedigree	Parentage	Seedlings planted in 1955 1/	Replanted 1956	Replanted 1957	Healthy in 1958 2/
B 3806	B 2944-65 x B 24-58	241	4	1	1
B 3808	B 2946-5 x B 24-58	254	12	4	2
B 3815	B 24-58 x B 2834-3	250	15	8	1
B 3821	X927-3 x B 24-58	351	9	1	1
B 3824	X927-3 x B 2946-5	306	7	1	1
B 3825	X927-3 x B 2963-7	351	10	4	1

1/ 25 crosses and 3 selfed lines were represented in 1955.

2/ Not infected in 1958.

Maine table 2. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1956-58.

Pedigree	Parentage	Seedlings planted in 1956 1/	Replanted 1957	Replanted 1958	Surviving 3 years
		No.	No.	No.	No.
B 4095	Rural New Yorker x B 2834-3	360	9	3	2
B 4107	X927-3 x Earlaine	334	7	3	1
B 4121	B 2925-23 x B 294-38	80	8	2	1
B 4122	B 2925-23 x Aquila	118	2	2	2
B 4123	B 2925-23 x B 2359-84	168	24	16	11
B 4126	B 2958-2 x B 3186-6	272	2	1	1
B 4127	B 2962-6 x B 2359-84	264	16	10	3
B 4139	B 3299-13 x B 2359-84	290	4	1	1

1/ 22 crosses and 1 selfed line represented in 1956.

Maine table 3. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial incoulations with viruliferous green peach aphids in 1957-1958.

Pedigree	Parentage	Seedlings planted in 1957 1/	Replanted 1958	Saved for retesting in 1959	Surviving two inoculations
		No.	No.	No.	Pct.
B 4236	Houma x B 24-58	267	63	31	11.6
B 4239	Houma x B 3556-12	426	91	37	8.7
B 4240	Katahdin x B 3556-12	86	2	0	0
B 4256	Sebago x B 3556-12	425	21	2	0.5
B 4260	B 24-58 x B 3139-24	384	8	1	0.3
B 4261	B 24-58 x B 3556-12	226	14	11	4.9
B 4263	B 24-78 x B 3299-13	98	4	1	1.0
B 4264	B 24-78 x B 3556-12	486	86	62	12.8
B 4266	B 24-78 x Ac. 26031	30	2	1	3.3
B 4282	B 606-37 x B 3556-12	64	2	1	1.6
B 4292	B 926-9 x B 3556-12	452	24	4	0.9
B 4293	X927-3 x B 4005-10	383	26	4	1.0
B 4301	B 2067-52 x B 3556-12	151	2	0	0
B 4310	B 3299-13 x B 24-58	382	19	6	1.6
B 4311	B 3302-68 x B 3556-12	475	23	13	2.7
B 3535	Houma x B 294-38	165	5	3	1.8
B 4341	B 1383-5 x B 922-3	152	11	4	2.6
B 4343	B 2962-6 x ND 457-1	185	4	0	0
B 1522	B 3556-12 selfed	51	3	2	3.9

1/ 21 crosses and 1 selfed line represented in 1957.

Maine table 4. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1958.

Pedigree	Parentage	Seedlings planted in 1958	Saved for retesting in 1959	Surviving the first year's inoculation
		No.	No.	Pct.
B 4449	X927-3 x Katahdin	832	20	2.4
B 4450	X927-3 x B 3139-24	144	3	2.1
B 4451	X927-3 x B 3556-12	90	5	5.6
B 4457	B 2834-3 x B 24-58	188	26	13.8
B 4466	B 3556-12 x 96-56	225	10	4.4
B 4470	41956 x B 3556-12	208	3	1.4
B 4471	B 24-58 x B 3945-12	254	5	2.0
B 4477	B 606-37 x B 3391-19	36	2	5.6
B 4479	B 991-14 x B 3556-12	91	4	4.0
B 4487	B 3139-24 x X927-3	16	0	0
B 4490	B 3391-2 x B 3556-12	81	19	23.5
B 4491	B 3391-2 x B 3944-11	428	16	3.7
B 4492	B 3397-17 x B 3391-19	133	18	13.5
B 4493	B 3397-17 x B 3556-12	24	7	29.2
B 4514	Ac 26033 x B 3813-30	27	0	0
B 4525	B 3293-9 x B 355-24	86	3	3.5
B 4526	B 3391-19 x WV 14-17	186	3	1.6
B 4527	B 3797-17 x WV 14-17	151	9	6.0
B 4532	B 3556-12 x WV 14-17	45	0	0
B 4534	B 3556-12 x B 3817-53	198	21	10.6
B 4539	B 3718-WV 4 x B 3556-12	85	5	5.9
B 4541	B 3719-1 x B 3813-30	216	0	0
B 4545	WV2-4 x B 3536-12	194	0	0
B 4555	WV 14-17 x B 3813-20	45	0	0
B 4556	WV 14-17 x B 3817-53	16	2	12.5
B 4558	B 3391-19 x B 355-24	394	1	0.3
B 4559	B 3391-19 x B 3139-24	110	2	1.8
B 4578	B 3556-12 x 96-56	126	0	0
B 4583	B 3097-82 x B 3556-12	34	0	0
B 4585	X927-3 x B 3299-13	78	0	0
B 4586	X927-3 x B 294-38	202	5	2.5
B 4597	B 595-76 x B 294-38	59	0	0
B 4620	B 3209-35 x B 3556-12	89	0	0
B 1554	B 3391-19 selfed	33	1	3.0
B 1557	B 3817-53 selfed	53	0	0
B 1562	X 926-3 nat.pollinated	163	8	4.9
		5,340	198	3.7

Maine table 5. Reaction of selections of 46 crosses from Chapman Farm, to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in 1957.

Selections tested	Number tested 1/2/	Number of hills infected 0	1	2	3	4	5
Seedling varieties	522		1	1	1		519
Parents and checks	60						60

1/ Each seedling had 5 plants tested.

2/ Eight 5-hill Green Mountain checks all showed symptoms of current-season leafroll infection.

Maine table 6. Reaction of certain progenies from the Iowa breeding program to leafroll infection following inoculation with viruliferous green peach aphids in 1956, 1957, and 1958.

Pedigree	Parentage	Number tested 1956	Replanted and retested 1957	1958	Saved for retesting in 1959
MI 1419	X 927-3 x I 1077-W 28-5	870	11	8	1

MASSACHUSETTS

Karol J. Kucinski

Average yields and quality data of 17 varieties of potatoes tested in 1958 for comparative yields at the Massachusetts Agricultural Experiment Station are shown in Massachusetts table 1. Each variety was replicated twice. A ton per acre of 10-10-10-2 fertilizer was applied in drill. The plots were sprayed weekly with 4 lbs. parzate per hundred gallons of water, supplemented with D.D.T. as needed. Tractor and sprayer rows were eliminated by using a side-arm boom for spraying. The potato season was abnormally wet, causing poor quality and yield.

Massachusetts table 1. Average yields and quality data of 17 varieties of potatoes tested at the Massachusetts Agricultural Experiment Station, 1958.

	Average yield per acre of 2 plots					
Variety	Yield Rank	Size A	Size B	Total	Total Solids	Quality
		cwt.	cwt.	cwt.	Pct.	
50B9-8 *	1	398	13	411	18.5	6
B73-3 *	2	377	9	386	20.1	2
Tawa *	3	339	5	344	18.3	8
Kennebec	4	280	11	291	19.8	3
Plymouth	5	266	6	272	17.2	12
Delus	6	251	6	257	18.1	9
Cherokee	7	243	12	255	17.9	10
Teton	8	239	11	250	16.3	14
Merrimack	9	239	10	249	19.0	4
B75-4 *	10	241	6	247	18.9	5
Huron	11	230	16	246	18.4	7
Saco	12	237	8	245	18.4	7
Warba *	13	221	3	224	18.9	5
Green Mt.	14	214	8	222	20.4	1
Russet Burbank	15	191	23	214	16.9	13
Sebago	16	194	9	203	12.3	15
Pungo	17	177	6	183	17.5	11

* Data based on 1 plot.

Data of tests made on three different soil types, two in Connecticut River Valley and one in hilly section of Worthington are shown in Massachusetts table 2. These are under farmer conditions of cultivation and spraying. One hundred feet of each variety was harvested. Tractor rows were not used. The soil types were very fine sandy loam, silt loam, and fine sandy loam, respectively, for farms A, B, C.

Massachusetts table 2. Data of tests made on three different soil types, two in Connecticut River Valley and one in hilly section of Worthington in 1958.

Variety	Sunderland (Farm A) Total yield per acre	Sunderland (Farm A) Total Solids	Hatfield (Farm B) Total yield per acre	Hatfield (Farm B) Total Solids	Worthington (Farm C) Total yield per acre	Worthington (Farm C) Total Solids
	cwt.	pct.	cwt.	pct.	cwt.	pct.
Saco	436	19.0	295	19.6	361	21.2
Delus	280	16.8	256	17.7	268	21.7
Cobblers	366	18.9	261	18.2	226	18.6
Merrimack	211	20.0	228	16.6	189	20.1
Teton	479	19.5	280	19.9	256	19.8
Huron	269	18.0	257	16.7	272	19.7
Kennebec	399	18.5	260	17.9	293	20.2
Katahdin	298	17.5	304	19.2	310	18.9
Plymouth	283	18.5	330	20.4	276	19.5
Sebago	308	16.8	421	19.3	257	19.4
Russet Burbank	259	19.0	244	18.3	234	19.3
Cherokee	225	19.2	331	18.7	203	19.5
Pungo	218	18.9	232	18.5	254	19.7
Green Mt.	356	20.7	258	18.5	219	21.5

MASSACHUSETTS
Robert A. Mullany

1958 Potato Yield Tests

Four yield tests were planted in Eastern States territory in 1958; one in Massachusetts and 3 at widely scattered locations in Pennsylvania. Each planting was located in a commercial grower's potato field and, with the exception of planting, treated culturally as his own. Sprayer rows were not involved in these tests. The experimental design was the randomized complete block, with 4 replications at each location. Individual plots consisted of 1 25-foot row with ten-inch spacing between plants, with the exception of Delus at a six-inch spacing. The following paragraphs give test locations, and the fertilizer and previous cropping practices followed by each cooperator.

The farm of Norman Whiteside is located on heavy loam soil in the town of Oxford in Lancaster County, Pennsylvania. Potatoes in 1955 were followed by wheat in 1956, and a grass-wheat mixture in 1957. Fifteen tons per acre of manure was plowed down and 2,300 pounds per acre of 5-10-15 applied with the planter in 32-inch rows. The test was planted April 24 and harvested October 1.

The Fred Oswald farm is located in New Tripoli, in eastern Pennsylvania, and has a shaly loam soil. The previous year's crop was a clover-grass mixture in a potato-wheat-hay rotation. Ten tons per acre of manure was plowed down, with 1,000 pounds per acre of 8-16-8 banded in 34-inch rows. Five hundred pounds per acre of superphosphate was drilled after planting. The planting date was May 20 and the harvest date October 8.

Ebensburg, in western Pennsylvania, is the location of the farm of cooperator John Norman Griffith. The soil type is a heavy loam. Ten tons per acre of manure and 500 pounds per acre of triple superphosphate was plowed down with a clover-alfalfa sod. One thousand pounds per acre of 6-18-18 was applied with the planter in 34-inch rows. The test was planted May 19 and harvested October 13.

The Williams Brothers farm, located in Old Deerfield, Massachusetts, has a sandy loam soil. Two years of corn preceded the potato crop. One ton per acre of 8-12-12 was applied in 36-inch rows by the planter. The planting date was May 3 and the test was harvested October 21.

As indicated by the good yields, growing conditions for potatoes were comparatively good at all locations. July and September were wet months at Ebensburg, but with adequate moisture and cooler temperatures prevailing over most of the growing season, optimum yields were realized. New Tripoli and Oxford areas had dry periods in early September, but Oxford with an earlier planting date fared much better. Both these locations were helped by cooler-than-normal temperatures. The Massachusetts location had comparatively cooler temperatures and a good moisture supply until the final stages of the growing season, the latter tending to penalize the very late varieties.

All Katahdin and Chippewa entires were from Eastern States stocks, and the Huron variety was supplied by the Canadian Department of Agriculture. All other test lots were provided by the USDA.

The Huron variety showed the most promise in these tests. The Old Deerfield location was the only test where it did not yield significantly higher than Katahdin, and this was due to a late drought period and a heavy set. The dry-matter content was significantly higher than Katahdin at all locations. However, there is a tendency to deep apical eyes, and chip color was only fair. Plymouth tended to be down in yield and dry matter, and chipped poorly. Delus was consistently high in dry matter and chipped well, but this variety continues to be hampered by poor set. Tawa was also down somewhat in yield. Of the seedlings, 50B9-8 displayed promise in respect to yields, but this advantage was offset by a high percentage of defects, relatively low dry matter, poor chipping, and also is apparently more susceptible to shallow scab than the Katahdin variety. The other seedlings were lacking in one or more of the characteristics desirable in a variety. The various Virus X comparisons showed no significant differences in yields in 1958, though definite trends were apparent.

The ratings on chip color were based on representative samples from one replication at each location being chipped as freshly harvested under commercial chip production conditions. This was made possible through the cooperation of the Herr and Snyder Potato Chip Companies of Nottingham and Berlin, Pennsylvania respectively, and the State Line and Manhan Potato Chip Companies of Wilbraham and Northampton, Massachusetts respectively. Samples out of 50°F. and 40°F. storage will be chipped at a later date.

The following tables contain data on total and U.S. No. 1 yields, dry-matter content and chip color.

Eastern States table 1. Total yield per acre, 1958.

	Town and State			
	New Tripoli, Pa.	Oxford, Pa.	Ebensburg, Pa.	Deerfield, Mass.
	Cwt.	Cwt.	Cwt.	Cwt.
Katahdin X-free	334	541	397	360
Katahdin 33% X	318	510	435	356
Katahdin-severe X-immunized	298	484	443	298
Chippewa - regular	332	534	487	311
Chippewa-severe X-immunized	348	554	478	327
Plymouth	300	384	431	289
50B9-8	332	655	557	413
B605-10	344	510	430	290
Huron	405	-	607	348
Delus	-	467	354	214
B 75-4	233	306	331	-
49B13-2	318	-	-	300
Tawa	-	430	390	-
B 73-3	257	400	-	-
B 3299-13	-	-	-	401

Eastern States, table 2. Yield of U. S. No. 1 tubers and defects*, 1958.

Variety	Town and State											
	New Tripoli, Pa.			Oxford, Pa			Ebensburg, Pa.			Deerfield, Mass.		
	U.S.No.1		Defects	U.S.No.1		Defects	U.S.No.1		Defects	U.S.No.1		Defects
	Cwt	Pct	Pct	Cwt	Pct	Pct	Cwt	Pct	Pct	Cwt	Pct	Pct
Katahdin X-free	299	90	0.0	491	91	2.0	374	94	1.0	337	94	1.3
Katahdin 33% X	283	89	0.3	472	92	1.0	400	92	0.4	332	93	0.7
Katahdin severe X-immunized	271	91	0.3	450	93	0.9	411	93	0.4	282	95	0.1
Chippewa regular	263	79	0.2	485	91	1.9	452	93	1.1	285	92	1.2
Chippewa severe X-immunized	302	87	0.1	519	94	1.1	445	93	0.0	310	95	0.1
Plymouth	257	86	1.5	338	88	6.3	402	93	1.3	274	95	1.0
50B9-8	253	76	8.2	461	70	19.0	481	86	8.3	354	86	7.5
B 605-10	291	84	3.7	449	88	7.1	388	90	3.9	260	90	5.6
Huron	338	83	4.6	-	-	-	554	91	1.5	296	85	2.7
Delus	-	-	-	424	91	4.8	335	95	0.5	194	91	1.0
B 75-4	187	80	3.7	261	85	8.2	284	86	10.4	-	-	-
49B13-2	290	91	1.8	-	-	-	-	-	-	278	93	2.7
Tawa	-	-	-	392	91	2.4	353	90	2.6	-	-	-
B 73-3	207	80	2.0	299	75	15.9	-	-	-	-	-	-
B 3299-13	-	-	-	-	-	-	-	-	-	345	86	9.3
L.S.D. .05	38			58			68			61		

* Defects include growth cracks and off-types only.

Eastern States table 3. Dry matter content and chip color rating,* 1958.

Variety	New Tripoli, Pa. Total solids	New Tripoli, Pa. Chip color	Oxford, Pa. Total solids	Oxford, Pa. Chip color	Ebensburg, Pa. Total solids	Ebensburg, Pa. Chip color	Deerfield, Mass. Total solids	Deerfield, Mass. Chip color
	Pct.		Pct.		Pct.		Pct.	
Katahdin X-free	21.05	-	16.33	-	19.66	-	17.88	-
Katahdin 33% X	21.30	4	17.02	2	18.98	2	17.66	3
Katahdin 1/	21.24	-	17.38	-	19.23	-	17.51	-
Chippewa regular	19.67	4	16.11	2	17.81	2	15.99	3
Chippewa 1/	19.73	-	15.98	-	17.07	-	15.56	-
Plymouth	20.10	3	15.99	1	18.80	1	16.84	1
50B9-8	20.74	1	16.95	2	17.26	1	16.29	1
B 605-10	19.41	1	17.51	1	18.37	1	16.11	1
Huron	22.45	2	-	-	21.18	2	19.41	1
Delus	-	-	19.91	3	21.18	3	19.48	4
B 75-4	19.36	-	18.12	3	18.31	2	-	-
49B13-2	19.54	4	-	-	-	-	16.96	2
Tawa	-	-	17.69	2	18.00	4	-	-
B 73-3	22.32	-	19.48	4	-	-	-	-
B 3299-13	-	-	-	-	-	-	16.65	1
L.S.D. .05	.83		.88		.94		.82	

* Chip color code: 1, poor; 2, fair; 3, good; 4, excellent. Samples were tested at harvest.

1/ Severe X-immunized.

MICHIGAN

N. R. Thompson, D. R. Isleib, E. J. Wheeler
and W. J. Hooker

Potato improvement is a cooperative program between the departments of Farm Crops and Botany and Plant Pathology. The objectives of the program are those outlined earlier.

Sixty-five thousand seeds were harvested from 51 controlled crosses made in the greenhouse in February and March. Selection of parents of known transmitting and combining ability plus seedling screening for late blight, virus X, and scab has permitted a marked reduction in the size of the seedling population. More time is available for detailed study of advanced selections. It was possible to increase the plantings of advanced selections for detailed studies of culinary qualities (table stock and processing) storage and handling qualities and resistance to diseases not included in seedling screening processes.

Seedling yield trials were conducted at the Lake City Experiment Station and the M.S.U. Muck Farm near East Lansing.

Potato variety trials were conducted at nine locations in Michigan during 1958, seven on mineral soil and two on muck soil. The twelve entries at each location were replicated four times in a randomized complete block. Each individual plot was a single row twenty feet long. The following Michigan tables show the average yield of tubers 1 7/8" and above, the percent of total yield which this represents, and the average total solids.

Selection for leaf roll resistance in the seedling stage is possible providing that inherent resistance is sufficiently high. Seedling plants exposed to leaf roll when in the 3-4 leaf stage were grown in the field. Resistant survivors of this seedling inoculation were grown as clonal lines for 2 seasons and selected for freedom from leaf roll. Five sprouted tubers from each of the healthy appearing clonal line were exposed to leaf roll infection by repeatedly shaking viruliferous leaf hoppers over the tubers. These tubers were then planted in the field. The majority of the plants resistant in the seedling stage remained resistant when exposed to viruliferous aphids on the sprouts. A total of 292 different clonal lines of potatoes were exposed to infection in April and May, 1958. Of these, 16.4 percent (43 lines) were saved because of high leaf roll resistance and good type. Clonal lines showing one or more plants with leaf roll were discarded for leaf roll susceptibility. As a result 32.5 percent (95 lines) were discarded. In contrast, 51 percent (149 lines) were discarded because of undesirable type.

Michigan table 1. Seedling yield trial, Lake City, 1958.

Seedling No.	Yield per acre Bu.	U. S. No. 1 Pct.	Total Solids Pct.
Ia 1165-23	737	93.8	17.8
Ia 1111-5	694	91.5	18.4
Ia 1111-8	675	88.4	18.5
R 133-9	665	92.6	18.1
R 220-7	662	94.1	17.8
R 360-7	642	93.9	17.4
Ia 1109-9	603	93.0	18.1
Ms 1346-4L	599	87.5	18.5
Ia 1066-1	596	92.3	19.1
Ms 1398-6L	573	91.3	18.3
Ia 1196-9	570	84.0	17.0
Ms 1316-1L	563	95.4	18.3
R 113-14	563	91.9	18.1
R 113-16	560	93.0	18.4
R 113-24	560	91.3	18.5
Ia 1073-1	550	89.3	17.5
Ms 1303-3L	547	95.3	18.8
Ms 1346-19M	541	85.2	17.8
Sebago	410	94.4	18.3
Mean	595	91.5	18.1

Michigan table 2. Seedling yield trial, Lake City, 1958.

Seedling No.	Yield per acre Bu.	U. S. No.1 Pct.	Total Solids Pct.
Ms 1426-3	1020	91.6	19.1
Ms 1408-1	981	90.5	18.4
Ms 1410-1	890	87.7	18.5
Ms 1408-4	803	88.1	17.8
Ms 1408-3	803	78.0	19.1
Ms 123-9	797	74.4	18.9
Ms 1411-3	628	78.5	18.1
Ms 1404-1	516	64.5	18.5
Mean	804	81.6	18.5

Michigan table 3. Seedling yield trial, Muck Farm, 1958.

Seedling No.	Yield per acre U. S. No. 1		Total Solids
	Bu.	Pct.	Pct.
Ia 1037-1	548	94.9	16.8
Ia 1073-1	542	93.2	16.9
Ia 1107-3	533	92.2	17.4
Tawa	515	87.3	17.9
Ia 1111-5	459	90.2	17.8
Ia 1109-9	432	93.2	17.9
Ia 1111-2	423	90.5	16.7
Sebago	421	90.7	16.9
Ia 1111-20	410	86.2	17.6
Ia 1111-16	394	91.0	18.0
Mean	467	90.9	17.4

Michigan table 4. Average yield and specific gravity of potatoes grown in Michigan variety trials at seven locations on mineral soil and two locations on organic soil in 1958.

Variety	Mineral Soil			Muck Soil		
	Yield per acre U. S. No. 1		Total Solids	Yield per acre U. S. No. 1		Total Solids
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
Huron	591	93.9	19.1	606	86.1	18.3
Onaway	472	93.2	18.0	441	83.0	17.5
Merrimack	456	96.2	19.9	440	93.0	19.1
Kennebec	444	95.0	18.8	492	93.1	17.9
Plymough	433	94.5	18.2	543	88.2	18.0
Keswick	430	97.4	18.3	473	83.6	18.0
Katahdin	426	90.6	18.5	688	92.8	18.0
Sebago	409	94.4	18.2	540	91.6	17.8
Russet Rural	397	92.2	19.3	669	91.5	18.8
Delus	397	97.3	19.6	476	86.3	18.8
Cherokee	364	95.1	19.1	285	83.3	18.0
Russet Burbank	325	82.6	19.5			
Tawa				440	89.3	17.5
Mean	428	93.5	18.9	501	88.5	18.1

MINNESOTA

F. I. Lauer and Arnold Blomquist, Horticulture
C.J. Eide and Kenneth Knutson, Plant Pathology

The work carried out in 1958 was a continuation of the potato breeding program described in previous reports. Major emphasis was given to (1) the development of pollen-fertile, early-maturing parent clones relatively homozygous for resistance to common scab and/or field resistance to late blight, and (2) combining factors affecting adaptation, market and table qualities, red-tuber color, resistance to common scab, late blight and virus X in crosses for commercial varieties.

The report which follows discusses (1) field resistance to late blight, (2) relation of resistance to common scab and russet scab, and (3) reaction of U.S.D.A. selections to common scab.

Field Resistance to Late Blight. A total of 936 R and RO clones (with and without immunity genes) were included in a screening plot at Castle Danger for field resistance to late blight. The plot was inoculated on July 9 with a mixture of 6 late blight races, 0; 1; 4; 1,4; 2,4; and 1,2,4. The first leisons appeared on July 15. From subsequent observations it became obvious that only race 0 and perhaps race 4 contributed to the epidemic; the other races, 1; 1,4; 2,4; and 1,2,4, apparently failed to produce an initial infection. In this connection, it should be noted that in 1957 race 1,2,4 was used exclusively as inoculum, a good initial infection was obtained, but an epidemic did not result in spite of apparently favorable conditions. In 1956 as well as 1955, however, races 1,4 and 2,4 did produce good epidemics.

Data for the response of a number of field-resistant RO clones in 1956 and 1958 are given in Minnesota table 1. Estimations of field resistance are based on the percent of green foliage present at various intervals after inoculation. Agreement between the data of the two years is surprisingly good. Moreover, since the epidemic in 1956 consisted of races 1,4 and 2,4 and in 1958 of race 0, the data suggest that the generalized type of resistance, i.e., field resistance, is little affected by the variability of the pathogen.

Minnesota table 1. A comparison of the response of field resistant RO clones for two years, 1956 and 1958.

	Green Foliage					
	1956			1958		
	Days after inoculation			Days after inoculation		
Selection	26	33	40	26	37	44
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
M12	80	60	15	60	40	10
M11	70	50	10	60	40	15
10.46-6-48	70	60	30	60	20	0
79.49-3-51	70	40	15	80	80	40

Minnesota table 1. (continued)

Redkote	80	50	30	80	60	40
59-11-6	90	30	10	60	40	20
23-1-2-1	95	70	30	80	40	10
23-1-2-3	95	80	20	40	20	5
52-5-5	90	75	50	100	60	10
528-1	90	70	20	40	5	5
528-6	95	99	99	100	100	80
528-28	95	90	80	95	80	60
M1	60	40	10	60	20	5
45.47-1-50	70	60	15	60	20	5
Voran	95	80	50	95	99	95
Ostbote	95	90	70	95	95	60
528-170	70	60	50	80	50	50
Red Pontiac (check)	70	20	10	60	40	10
Waseca (check)	10	0	0	15	5	0
Chisago (check)	30	0	0	15	5	0

In Minnesota table 2, distributions for field resistance as estimated by percent of green foliage are presented for three selfed progenies derived from RO parents, low to intermediate in resistance. The parents used are adapted to local growing conditions and have Cobbler maturity, desirable tuber type and resistance to common scab. Their field resistance is probably derived from Jubel and Hindenburg (see Minn. Rpt. to Nat. Pot. Breed. Prog., March, 1957). Though a very limited number of clones were studied, the range in segregation for field resistance obtained in each progeny was sufficiently great to practice effective selection for increased resistance. In each progeny, segregates were obtained with greater resistance than that possessed by Red Pontiac which has commercially useful resistance. Through the use of systematic breeding procedures to concentrate genes conditioning field resistance, it appears possible to develop highly resistant materials from these adapted parents.

Minnesota table 2. Distributions for field resistance to late blight in selfed progenies of three RO parent clones, low to intermediate in resistance.

Progeny	Days after inoculation	Number of clones having indicated percent of green foliage											
		100	97-100	94-97	88-94	75-88	50-75	25-50	12-25	6-12	3-6	0-3	0
83 Ⓧ (8 clones)	26			2	2	2	*2						
	34					2	*1	4		1			
	44							1	*3	2		2	
84 Ⓧ (8 clones)	26			4	1	**1	2						
	34					5	1	**1	1				
	44						1	4	*	*2	1		
85 Ⓧ (20 clones)	26			2	2	7	*7	3				1	1
	34					2	3	*7	1	1	1	1	4
	44							1	2	*4	3	3	7

Minnesota table 2. (continued)

Checks 1/								
26	PP	C	C	WWW	WCC			
34			PP		C	WC	WWC	WC
44				P	P		WC	WWW
								CCC

*Reaction of parent clone.

1/ W = Waseca - 4 plots (low resistance)
C = Chisago - 4 plots (low resistance)
P = Red Pontiac - 2 plots (low to intermediate resistance)

Distributions for a selfed progeny derived from an RO parent, intermediate in resistance, and also a test cross with an RO parent, low in resistance, are given in Minnesota table 3. It will be seen that a wide range in segregation for field resistance was obtained in the selfed progeny with the parent clone approximately intermediate in relation to its progeny. It should be noted that one segregate showed no apparent defoliation 34 and 44 days after inoculation. The range in field resistance was similar to that of another progeny derived from the same parent (see Minn. Rpt. to Nat. Pot. Breed. Prog., March, 1957).

In comparison to the selfed progeny, the test cross with a parent, low in resistance, shows a marked reduction in field resistance. Nevertheless, some of the segregates had field resistance equal to that of the resistant parent. In general, the segregations for field resistance in the selfed and test progenies are characteristic of quantatively inherited characters and parallel, for example, those for resistance to common scab.

Minnesota table 3. Distributions for field resistance to late blight in a selfed progeny of an RO parent clone, intermediate in resistance, and in test progeny with an RO parent clone, low in resistance.

Progeny	Days after inoculation	Number clones having indicated percent green foliage											
		100	97-100	94-97	88-94	75-88	50-75	25-50	12-25	6-12	3-6	0-3	0
528 (X) (25 clones)													
	26		6	6	*3	*7	1	2					
	34	1	3	2	5	*5	4	*3	1	1			
	44	1			2	*6	6	*4	3	1	2		
528 x 15-2-10-1-2 (33 clones)	26		2		3	4	4	9	8	2		1	
	34					2	6	7	4	4	5	2	3
	44						1	5	9	5	2	6	5
Checks 1/													
	26					P	P	WP	WCC			C	W
	34						P	P	P		WC	WC	WC
	44							P	P		P	WCC	WWC

* Reaction of parent clone - 2 plots
1/ W = Waseca - 3 plots (low resistance)
C = Chisago - 3 plots (low resistance)
P = Red Pontiac - 3 plots (low to intermediate resistance)

The responses for field resistance of 170 advanced clones from a variety of untested RO parents are summarized in Minnesota table 4. Almost all of these clones have scab resistance and, as noted above, probably derive whatever field resistance they have from the German scab sources, Jubel and Hindenburg. The data serve to illustrate the range in segregation for field resistance in these materials. At 34 and 44 days after inoculation, 14 or 8.2 percent and 17 or 10.0 percent of the clones, respectively, had field resistance equal to or greater than the Red Pontiac check. In contrast, of the 61 clones tested in the four selfed progenies given in Minnesota tables 2 and 3, 34 or 55.7 percent and 27 or 44.3 percent, 34 and 44 days after inoculation, respectively, had field resistance equal to or greater than the Red Pontiac check.

Minnesota table 4. Distribution for field resistance to late blight in an assortment of clones derived from a variety of untested RO parents.

Day after inoculation	Number clones having indicated percent green foliage											
	100	97-100	94-97	88-94	75-88	50-75	25-50	12-25	6-12	3-6	0-3	0
(170 selections)												
26		1	8	9	19	25	47	27	11	6	10	7
34				1	4	9	33	23	22	15	35	28
44						1	6	11	16	23	48	65
Checks 1/												
26					P			C	W			
34						P				C	W	
44								P			C	W

1/ W = Waseca - average of 4 plots (low resistance)
C = Chisago - average of 7 plots (low resistance)
P = Red Pontiac - average of 6 plots (low to intermediate resistance)

When several named varieties with different degrees of field resistance were inoculated uniformly with Phytophthora infestans, Cobbler developed about 3 times as many infections as Alpha, 4 times as many as Ostbote, and 6 times as many as President. These differences could not be associated with the thickness of the cuticle and outer epidermal walls, which didn't differ consistently among the varieties. Injuring the cuticle by rubbing with carborundum before inoculation increased infection in Ostbote and Sebago more than it did in President and Pontiac.

Relation of resistance to common scab and russet scab. Russet scab is an important problem to potato growers in the Red River Valley. To test the presence of an association between resistance to common scab and russet scab, the Minnesota and North Dakota Experiment Stations exchanged a limited number of clones. Data on common scab were obtained in a scab plot at Grand Rapids, Minnesota, while those on russet scab, kindly furnished by R. H. Johansen of NDAC, were obtained at Northwood, North Dakota.

The response of some Minnesota selections to common scab and russet scab are given in Minnesota table 5. The data suggest little or no association between resistance to common scab and russet scab. Apparently, the two diseases have different causes.

Minnesota table 5. A comparison of the reaction of Minnesota selections to common scab at Grand Rapids, Minnesota, and to russet scab at Northwood, North Dakota, 1958.

Selection	Common Scab		Russet Scab 1/	
	Severity 2/	Coverage 3/	Severity 2/	Coverage 3/
24.48-4-50	2	L	2	M
14-6-2-1	3	L	1	M
M20	5	H	1	H
62.50-11-52	4	M	2	H
97.55-8-56	2	M	2	M
528-113	2	M	3	M
8-19	2	M	2	H
67.49-3-51	2	T	2	H
M11	3	M	2	H
528-143	5	L	2	H
23-1-2-1	3	L	1	M
391-8	3	L	1	H
Red Pontiac	5	H	2	H

1/ Russet scab data was furnished by R. H. Johansen, N.D.A.C., Fargo, North Dakota.

2/ Severity estimated by thickness of leison; 1, very small and superficial; 4, thickest corky-type leison; 5, pit scab.

3/ Trace, less than 1% of tuber area covered; L, 1 to 20%; M, 21 to 40%; H, over 40%.

Reaction of U.S.D.A. Selections to Common Scab. One of the uniform scab nurseries sent by the U.S.D.A. was tested for resistance to common scab at Grand Rapids, Minnesota. The data are presented in Minnesota table 6.

Minnesota table 6. Reaction of U.S.D.A. selections to common scab at the North Central Experiment Station, Grand Rapids, Minnesota, 1958.

	Common Scab Rating			
	Selection		Check3/	
Selection	Severity1/	Coverage2/	Severity1/	Coverage2/
B3114-67	1	L	5	L
B3457-2	1	L	5	T
B4087-5	2	M	5	M
B4090-1	2	L	5	H
B4090-5	-	-	5	M
B4093-2	4	L	5	M
B4093-7	2	M	5	H
B4093-14	2	H	5	M
B4093-15	4	M	5	H
B4094-9	2	L	5	H
B4105-2	-	-	5	M
B4116-2	4	H	5	H
B4119-1	5	M	5	M
B4120-2	1	M	5	H
B4128-14	4	H	5	L
B4130-7	3	L	5	H
B4130-11	2	H	5	H
B4132-14	3	H	5	M
B4132-23	2	H	5	L
B4132-25	-	-	5	M
B4134-24	5	L	5	T
B4134-34	4	M	5	T
B4135-2	3	M	5	M
B4158-5	2	M	5	L
B4170-3	2	L	5	M
B4207-1	-	-	5	H

1/ Severity estimated by thickness of leison; 1, very small and superficial; 4, thickest corky-type leison; 5, pit scab.

2/ Trace, less than 1% of tuber area covered; L, 1 to 20%; M, 21 to 40%; H, over 40%.

3/ Irish Cobbler check at one end of each 3-hill test row.

MINNESOTA

Orrin C. Turnquist

1958 Minnesota Potato Variety Demonstrations

This past season the University of Minnesota conducted seven potato variety demonstration plots in the commercial producing areas of the State. These trials are in cooperation with commercial growers, county agricultural agents, branch experiment stations and the Minnesota Department of Agriculture. The purpose of these plots is to familiarize the grower with new potato varieties and to assist him in evaluating the varieties for use in his area.

One hundred pounds of seed of each variety is planted in a double row with a commercial planter. Each plot is laid out in a randomized block design and replicated twice in the growers' commercial potato field. At harvest, the potatoes from a rod row within the double row of each variety are weighed and graded for size. Samples are taken for specific gravity and potato chipping tests.

In 1958, four plots were conducted in the Red River Valley area at Oslo, Barnesville, Crookston, and Grand Forks. The results of these tests are presented in table 1. Other trials were located at Grand Rapids and Osseo on the sand and at Hollandale on the peat. These data are presented in tables 2, 3, and 4, respectively. The source of seed of a variety was the same for each plot. At Grand Forks, Grand Rapids, and Hollandale the varieties Plymouth and Tawa were late in arriving for planting. Low yields of these two varieties may be attributed in part to their late planting.

To supplement the information presented in Turnquist tables 1 to 4 some comments on the newer varieties tested in 1958 are as follows:

Plymouth - A new white variety resistant to scab and late blight. It is mid-season in maturity. The tubers are oblong-flattened with shallow eyes and rough flaky skin. It has been reported to be a high yielder with high total solids. Chipping quality is good. In 1958 trials Plymouth produced more attractive tubers than in previous years trials.

Redbake - A new red variety of mid-season maturity. Tubers are oblong and somewhat flat with shallow eyes. Skin is smooth or slightly netted. Specific gravity is high and chipping quality is good. It is reported to reconstitute well after cold storage.

Huron - A white variety recently released from Canada with scab resistance but very late maturity. Tubers are oblong to round with medium deep eyes. It produces high dry-matter tubers but yield and market quality has not been too promising.

Turnquist, table 1. Performance of Potato Varieties in Red River Valley Demonstration Plots in 1958

	Oslo			Barnesville			Crookston			Grand Forks			Average		
Varieties	Total Yield	No.1 Size	Dry Matter	Total Yield	No.1 Size	Dry Matter	Total Yield	No.1 Size	Dry Matter	Total Yield	No.1 Size	Dry Matter	Total Yield	No.1 Size	Dry Matter
	cwt.	Pct.	Pct.	cwt.	Pct.	Pct.	cwt.	Pct.	Pct.	cwt.	Pct.	Pct.	cwt.	Pct.	Pct.
Kennebec	189	91	21.7	228	89	21.9	188	94	24.0	190	98	22.7	199	93	22.6
Red Pontiac	180	92	20.8	191	92	19.5	204	96	21.9	172	98	21.7	187	94	21.0
Red LaSoda	177	92	21.4	188	91	20.2	190	96	22.3	178	98	21.9	183	94	21.4
Redburt	181	92	21.4	173	89	19.8	164	89	23.1	169	91	21.7	169	91	21.7
Redbake	165	93	21.7	-	-	-	-	-	-	-	-	-	165	93	21.7
Early Gem	187	96	20.0	146	92	18.5	172	99	21.9	140	99	20.0	161	96	20.1
I.Cobbler	146	89	25.7	176	78	21.4	177	90	24.4	142	93	24.2	160	88	23.9
Minn. 11	153	90	22.7	166	83	20.6	-	-	-	-	-	-	160	86	21.6
Cherokee	145	88	22.7	172	88	23.4	171	87	25.3	127	95	24.2	154	90	23.9
Nordak	-	-	-	-	-	-	-	-	-	154	98	21.0	154	98	21.0
Norland	164	91	23.1	152	82	20.0	124	90	21.0	171	97	21.0	153	90	21.3
Norgleam	-	-	-	-	-	-	-	-	-	150	98	21.7	150	98	21.7
Dazoc	161	91	21.4	112	58	19.5	145	84	24.0	148	87	22.9	142	80	22.0
Huron	138	87	21.7	-	-	-	-	-	-	-	-	-	138	87	21.7
Waseca	154	94	23.1	122	80	19.1	131	90	21.0	128	94	21.7	134	90	21.2
Antigo	134	91	20.8	-	-	-	-	-	-	-	-	-	134	91	20.8
Plymouth	140	96	21.7	158	91	22.3	137	89	24.6	89*	99	21.2	131	94	22.4
R.Burbank	151	85	19.8	119	80	21.7	159	91	24.9	93	99	22.9	130	89	22.3
Tawa	147	92	21.4	139	87	20.8	131	71	24.2	96*	94	21.4	128	86	22.0
Average	160		21.8	160		20.6	161		23.3	143		22.0	154		21.8

Cooperators: Oslo, Minnesota - Earl Mallinger - Planted May 26, Harvested September 23
Barnesville, Minnesota - Dale Barry - Planted June 6, Harvested September 26
Crookston, Minnesota - Northwest Exp. Sta. - B. C. Beresford - Planted June 1, Harvested
Grand Forks, North Dakota - Red River Valley Potato Research Farm - Harry Earl - * Planted on June 7, all others planted on May 24, Harvested September 25.

Turnquist table 2. Performance of Potato varieties at Grand Rapids, Minnesota in 1958.

Variety	Total Yield	No.1 Size	Dry Matter
	cwt.	Pct.	Pct.
Kennebec	323	93	19.3
Red Pontiac	321	91	16.2
Redburt	293	87	17.0
Green Mountain	271	89	18.7
Red LaSoda	262	88	17.0
Cherokee	251	88	18.1
Minn. 11	237	93	17.2
Russet Burbank	237	80	18.7
Minn. 355	231	92	19.1
Tawa*	218	93	17.7
Irish Cobbler	215	82	19.1
Dazoc*	209	87	17.4
Norland	202	87	16.6
Early Gem	190	86	17.9
Waseca	149	84	17.9
Plymouth*	132	82	16.4
Average	234	--	17.8

*Planted on June 19, all others planted on May 16; Harvested Sept. 23.
Cooperator: North Central Exp. Station
Nils Grimsbo

Turnquist table 3. Performance of Potato varieties at Osseo, Minnesota in 1958.

Variety	Total Yield	No.1 Size	Dry Matter
	cwt.	Pct.	Pct.
Redburt	422	96	18.5
Red LaSoda	401	96	18.1
Red Pontiac	375	96	17.2
Cherokee	371	92	18.9
Dazoc	354	95	16.8
Kennebec	332	97	18.7
Russet Burbank	308	94	18.7
Irish Cobbler	304	94	19.5
Norland	298	94	17.4
Early Gem	258	97	17.7
Waseca	209	96	17.7
Average	330	--	18.1

Planted April 28; Harvested Sept. 30.
Cooperator: Wilbur and Harvey Goetze

Turnquist table 4. Performance of Potato Varieties at Hollandale, Minnesota in 1958.

Variety	Total Yield	No. 1 Size	Dry Matter
	cwt.	Pct.	Pct.
Redburt	297	93	17.7
Red Pontiac	255	88	14.5
Red LaSoda	247	90	16.8
Early Gem	243	90	16.6
Cherokee	242	88	18.1
Irish Cobbler	241	90	18.9
Waseca	240	91	17.0
Norland	236	88	16.6
Dazoc	226	83	16.6
Kennebec	212	90	17.7
Russet Burbank	182	83	17.2
Tawa*	144	82	17.9
Plymouth*	142	85	17.9
Average	224	--	17.2

* Planted June 3, all others planted on May 22; Harvested October 8.
Cooperator: Brand Bros. and Southern Minnesota Vegetable Growers Association

Antigo - A round white variety with excellent scab resistance. It is medium early in maturity but tubers were inclined to be rough and irregular.

Norland - A new red variety as early as Waseca and Early Gem with smooth attractive tubers. It appears to be more tolerant of common scab and russet scab than the Red Pontiac. It produces high quality potato chips.

Tawa - A white variety with smooth round tubers with shallow eyes. It is resistant to scab, late blight and mild mosaic. Chipping and cooking quality are excellent.

NEBRASKA

H. O. Werner and R. B. O'Keefe

The comprehensive breeding program was carried through in Nebraska along the general lines described in earlier reports. The accumulative results of earlier work has become apparent in the greater degree of homozygosity of seedling populations with special reference to: (1) much higher percentages of segregates with darker red skin tubers; (2) generally good tuber type; (3) higher specific gravity; (4) more segregates with scab resistance, some with very high resistance. Combinations of several of these desirable factors plus other factors of commercial significance occur to an increasing extent in many of these segregates. Thus the inventory of clonal lines has been definitely enhanced both as to breeding stocks and selections approaching commercial merit.

The major efforts have been in (a) development of more homozygous parental lines, (b) screening of seedling populations for a number of factors, (c) extensive field testing of advance selections. Because of the great volume of the data gathered, this report is being confined to statement of the major activities and a presentation of results of conclusions that seem to be of significance and that are likely to be of interest to other potato breeders. To expedite presentation or availability to readers, etc., the report is divided into two major parts: I. Screening, evaluation (for commercial use), etc., of clonal populations, (most of this was the responsibility of H. O. Werner). II. Development of homozygous parental lines, especially for scab and heat resistance (in recent years primarily the work of R. B. O'Keefe, who prepared that portion of this report.)

I. <u>Screening, evaluation etc. of clonal populations</u>. (Approximately 600 clones carried in the Nebraska collection.)

The foundational seed stock of all clones is maintained on the Box Butte Experiment Farm where, chiefly because of dryland conditions, the environment is very satisfactory for maintaining stocks relatively free of virus diseases. On this farm a comprehensive sanitary regime of constant vigilant application of all practices essential for avoiding infection or spread of bacterial ring-rot has been enforced since September, 1953. The results with this regime have been above expectations. No ring-rot infected plants or tubers have been found in any stocks on this farm since the close of the 1955 field season. A comprehensive report of this phase was presented at the 1958 meeting of the Potato Association of America and is being submitted for publication in the American Potato Journal.

A. <u>Early screening of selections</u>: In all tests comprehensive descriptive notes have been taken of major observable characteristics with special reference to tuber type, color, shape, size, scab type and incidence, grade defects and interior color. Specific gravity was determined with most lots saved from irrigated plots and after that kodachrome pictures were obtained of most of these clones. (Color pictures on file, of tubers of all promising or parental lines saved during the past four seasons, now number about 1400.

With most of the years since 1942, black and white 35 mm. record pictures were obtained.)

1. Location of field tests and specific objectives of each:

   a. Box Butte Experiment Farm: dry land adaptability and scab.

   b. For scab resistance on a Scotts Bluff County irrigated farm where scab incidence has caused potato growing to be discontinued (two planting dates).

   c. Scotts Bluff Experiment Station: suitability for irrigation, scab susceptibility, also for specific gravity determination.

   d. Eastern Nebraska: for heat endurance.

   e. Trials in southern Texas and southern Florida.

2. Results of field trials:

   a. Regarding scab resistance: scab was sufficiently prevalent in all trials to permit dependable evaluation.

      (1) More than 61 Nebraska red tuber clones have been found to have high scab resistance (lesions of "2" or less), combined with one or several characters such as bright skin, good interior color, high specific gravity, good tuber type, satisfactory yield. The lesion type and low incidence of scab in 23 of these was on a par or less severe than with Hindenburg and Jubel.

      (2) Although development of scab resistant white tuber lines has only been incidental in Nebraska, we have 22 clones that show very high resistance. Some of these have many other good characteristics.

      (3) The most promising scab resistant clones that are considered as having some commercial suitability* for Nebraska or elsewhere are:
      *Lines selected primarily as parental source of scab resistance are considered in Section II of this report.

25.47-5X	white, excellent type and yield, but under some conditions tubers growth crack severely.
29.47-2	white, almost round tubers of excellent type, very good interior color, midseason, very productive, much scab resistance; defect for Nebraska is propensity sometimes for tubers to be hollow.
45.47-5X	white, good type.
114.51-2	excellent type, red tubers with very high scab resistance.
156.52-2	excellent type red tubers with very high resistance; a number of segregates in progeny have very good type red scab resistant tubers.

(4) Among the crosses of recent years (1956, 1957) there occur a number of segregates with high scab resistance combined with two to four very desirable commercial characteristics.

b. Promising segregates in crosses of recent years:

(1) 1955 crosses produced a large number of clones with red tubers of excellent type and high yield ability, combined with high specific gravity and very good interior color, but all except a few have little or no scab resistance. The most satisfactory parents used to derive these--most of which were combined with each other--and the characteristics they seem to have contributed to these phenotype selections were:

Redbake (formerly 26.44-1) - tuber type, red color, high specific gravity.
93.48-1 (ND133 x 117.43-3) - red, excellent type, high specific gravity, very good interior color.
95.48-1 (ND136 x 117.43-3) - very dark red color, tuber type, good interior color, high dry matter.
131.50-2 (117.43-3 x 368.48-3) - bright red skin, excellent type and interior color, fair to good specific gravity.
164.51-2 (194.49-2 x 86.48-1) - red color, bright skin, high dry matter, good chipping quality, good interior color, some heat and scab resistance.
181.51-2 (30.48-4 x 254.48-1) - bright red skin color, excellent interior color, some heat resistance, very good for chips.
North Dakota 2906-1R - good red color, good type, high specific gravity, good interior, some scab resistance.

(2) 1956 crosses netted many segregates of the horticultural quality of segregates of 1955 families. In addition, however, more of them have shown scab resistance, and bright red skin, and high dry matter and good tuber interior color occur more frequently. Most of the horticultural characteristics probably came from the parents listed as superior with 1955 crosses and which were also used in 1956. The lines that contributed the scab resistance, usually without incurring the loss of other characters, were:

86.49-1X (59.41-P1 x Minn. 43)
114.49-1X (25.42-2 x A65)
114.51-2 (47.47-1 x 134.47-2X)
222.51-9 (86.48-1 x 368.48-1)
156.52-2 (302.48-1 x 120.50-2)

c. In southern (winter) screening tests of Nebraska selections:

(1) With the Everglades Experiment Station at Belle Glade, Florida, (Dr. Orsenigo), a number of Nebraska lines showed scab resistance in replicated observational trials. There was little consistency between scab readings there and in Nebraska.

(2) At the Experiment Station at Weslaco, Texas--in the Rio Grande Valley (Paul Leeper), about half of the 45 clones of recent selection were superior in most or all characteristics to Red LaSoda--the present standard variety there. The specific gravity and chip quality of the tubers from many of these were very high.

d. Heat resistance determinations and variety selection:

(1) Methodology studies: The standard conditions utilized in heat machine testing of varieties for heat and heat induced drouth resistance are 120°F, 60% relative humidity, for 6 hours following conditioning of plants with a 15 hour photo-period of 700 f.c. When segregating progenies are tested (grown from true seed rather than tubers) the testing temperature is 116°F.

In 1958, the effects of gibberellic acid seed treatment and prehardening of plants on plant resistance were studied. The relationship of degree of plant wilt in the heat machine to leaf area (as measured with an optical planimeter) was also determined.

Treating seedpieces with gibberellic acid (10 ppm) to induce rapid sprouting had no effect on the heat resistance of plants produced. Paired plants (treated and untreated) of 16 varieties were included in the test.

Prehardening of plants by limited watering, and increasing carbohydrate content by lowering the temperature and shortening the photoperiod 2 weeks prior to testing increased the resistance of the plants to heat. Plants of 17 varieties were utilized in this study.

Increasing the carbohydrate content of seedling plants by low temperature and short photoperiod alone had little effect on heat resistance. Three hundred seedling plants (from true seed) were included in the tests.

As the leaf area of varieties increased the degree of wilt in the heat machine increased. Paired plants (on the basis of height) of 17 varieties were utilized in the tests. One of these plants was dissected and the leaf area was measured with an optical planimeter. The other plant was heat machine tested.

(2) Screening of advanced selections for heat resistance:

Thirty-eight advanced selections of potential value as commercial varieties were screened for heat resistance utilizing the standard heat machine test. The varieties found to exhibit moderate to high heat resistance were:

Red Tubers	White Tubers
114.49-1X (Scab Resist.)	77.51-2 (Scab Resist.)
90.49-1X	93.47-30X (Scab Resist.)
164.51-2 (Scab Resist.)	
106.52-2 (Scab Resist.)	

3. Results of quality tests:

a. Chip making quality:

(1) Development of an empirical method of evaluating chip color: With a chip color scoring system using 9 for very best color, 7 for fair, 6 for minimum acceptability and 1 for darkest brown, arranging the chips in a color gradient series and assigning proportional color values to chip samples placed between those given arbitrary unit values (9,8,7 etc.), results were much more satisfactory than when color was estimated with chips arranged in order of frying or in their field sequence, etc. Still further precision was gained by pulverizing the chips (1 to 5 mm. square pieces) and then arranging these in color gradient series. There was a very close correlation between these readings with crushed chips and the Rd readings made of them with a Gardner-Hunter color difference meter by Dr. Ora Smith, Director of Research of the American Potato Chip Institute.

The correlation of the Nebraska color estimates with the Rd readings was derived by plotting the color estimates, made on samples of crushed chips after arranging them in a gradient series, against the Rd readings with 144 samples. The range of each commercial category enumerated was derived by using the median color estimates for the Rd extremes of each range. The Rd values used for each range were suggested by Dr. Ora Smith in a letter of October, 1958, to H. O. Werner. The values for each category are:

Quality category	Rd values	Nebraska estimates of color of crushed chips arranged in gradient series
Excellent	Above 32	8.4 to 9
Very good	25 to 32	7.0 to 8.4
Good	20 to 25	6.0 to 7.0
Fair, but acceptable	17 to 20	5.0 to 6.0
Poor	12 to 17	4.0 to 5.0
Very poor	Below	1.0 to 4.0

(2) Screening tests - made before and after chilling:

a. When potatoes were reasonably mature and chipped before cold storage, about 80% of the clones grown in western Nebraska produced satisfactory chips, and about 1/3 produced very good chips or better.

b. After chilling 3 weeks, less than 50% produced acceptable chips when reconstituted at 70-75°F for 3 to 5 weeks, and only about 10% produced chips of superior commercial quality.

c. The clones (excluding those dealt with later as advance selections) from which chips of best quality were made after cold storage and reconstitution were:

White tuber clones	Red skin tuber clones
25.47-7X	77.44-1
45.47-5X	114.49-1X
302.50-5	143.50-2
77.51-2	176.50-3
156.51-2	181.51-2

d. From Texas grown tubers, excellent or very good chips were made from all except a very few clones tested.

b. Darkening of raw potato slices when dried in a laboratory room has been found to vary greatly by selections. This characteristic is considered important because of the increasing quantity of centrally peeled potatoes that are being used in metropolitan cities. After drying, dry slices of raw potatoes have been crushed to provide a sample of more homogenous appearance. These crushed samples have been arranged in a color gradient series and then been given graying or darkening estimates which have also been coordinated against Rd readings. The clones whose tuber slices darkened least were:

29.47-2	29.51-9
284.50-1	156.51-2
302.50-1	332.51-2
28.51-4	

There appeared to be no relation between lightness of chips and retention of light color in raw dry slices. Extreme examples of this lack of relationship were that with clones such as 181.51-2 and 77.51-2 very good chips were made, but raw slices were among the worst for darkening when dried. There also seemed to be no relationship between darkening and specific gravity. Casual study of pedigrees indicates that this darkening characteristic is heritable.

4. Virus X free program:
Clonal lines free of Virus X have been isolated and are being increased with the recently released Nebraska varieties Dazoc, Sheridan, Haig and Excel. With advance selections a number of X free clones have been isolated within 156.48-2X, 120.40-6 and 315.48-3X. Plants of progenies of several families with X immune parents are being tested. The serological method is being used. The field increase is done in carefully isolated, specially managed plots on dryland in western Nebraska. (All virus X serological readings and all field work has been the responsibility of Richard Miyoshi).

B. Advance adaptability and quality tests of new varieties and advance selections:

Replicated yield and quality evaluation trials of major commercial varieties and advance selections were conducted in eastern Nebraska without irrigation (3 trials), in central Nebraska with irrigation (2 trials) and in western Nebraska with irrigation (3 trials) and on dryland (3 trials) with the following general results:

1. As to yields, grade quality, etc., the status of various groups of varieties or selections, for which data on several vital factors are supplied in Nebraska Tables 1 to 6, was as follows:

   a. Established commercial varieties: Red Pontiac and Red LaSoda: highest yields of U.S.#1 potatoes of any named variety except in eastern Nebraska non-irrigated trials where Excel was superior; tuber type frequently not good; percentage of U.S.#1 grade intermediate; percentage of large potatoes very high. Red LaSoda may have been superior to Red Pontiac.

   Progress: best producer of good grade quality potatoes for western irrigation culture; scab resistance high; specific gravity good; too few large size potatoes (over 2-5/8"). On dryland tuber size was very satisfactory for seed purposes. The late strain of Progress (mutation isolated by Dr. Felton) yields were greater and percentages of large tubers were greater than with the standard variety.

   Dazoc: not satisfactory in western Nebraska because of low yield; meritorious in central and eastern Nebraska because of bright dark red tubers, although yields were not as high as with several other varieties or selections.

   b. Relatively new varieties: Excel: yields of U.S.#1 grade not as great as Red Pontiac and Red LaSoda but distinctly greater than Progress; superior in percentage of U.S.#1, tuber type and appearance; specific gravity values among the highest in most trials; a distinctly superior variety in eastern Nebraska non-irrigated trials.

Nebraska table 1. Yield, cwt. per acre, produced in 1958 Nebraska trials.

Variety or Selection Numbers	Western Nebraska (late crop)						Central Nebr.		Eastern Nebraska		
	Irrigated			Dryland			Irrigated		Dryland		
	Scotts Bluff County Exp. Sta.	Sioux County Dutch Flats	Sheridan County Mirage Flats	Box Butte County Expt. Sta.	Sheridan County Gordon	Banner County	Lincoln County Hershey	Dawson County Cozad	Douglas County Omaha Cultivate	Douglas County Omaha Straw Mulch	Dixon County Concord Expt. Sta.
	4020	4200	3830	4020	3500	5300	2900	2450	980	980	1480
	6-13	6-7	6-19	6-7	6-17	6-6	4-22	4-20	4-2	4-2	4-15
	9-29	10-7	10-10	9-25	8-27	10-6	8-20	8-18	8-4	8-4	8-11
	#1	#3	#4	#5	#7	#8	#9	#10	#11 C	#11 M	#12
Four 20-hill plots - each variety.											
156.48-2x	273.7	535.8	329.4	230.1	130.7	106.4	343.8	365.7	238.9	248.5	136.2
Progress	205.5	362.8	265.9	157.9	82.3	59.0					
Progress (L)	204.2	365.7	286.6	162.6	102.0	75.0					
Redbake	176.2	270.4	247.4	134.3	84.8	60.9	294.2	262.6	135.9	154.4	108.4
Dazoc	150.5	295.1	271.3	147.2	86.5	51.5	269.3	297.7	155.1	208.6	101.4
Excel	265.0	392.2	275.3	162.9	114.4	80.7	290.8	325.2	264.0	260.0	120.1
R.Pontiac	287.7	420.2	262.6	200.6	123.9	89.4	333.8	400.9	189.9	204.5	109.3
R.LaSoda	268.8	388.6	354.3	223.4	120.9	91.7	333.4	354.3	234.3	214.7	102.3
Redkote	214.3	343.4	249.6	186.3	125.3	90.7	266.6	271.7	202.7	176.6	81.8
90.49-1x	215.3	319.8	272.4	165.4	120.6	86.2	297.3	328.5	221.1	248.1	142.4
Haig	219.4	361.9	288.8	181.3	100.7	82.3	256.2	299.8	209.3	204.5	93.5
45.51-3	207.3	435.6	324.0	183.7	114.0	83.5	299.5	328.5	121.6	189.9	72.0
Canso	178.2	294.0	249.9	146.9	94.9	77.2					
Colo.1224.0	188.9	332.7	257.9	126.9	98.6	71.9					
*Norland	262.8	384.8	234.5	191.2	113.3	72.3	165.5	225.1	140.8	140.8	40.9
*Redburt	308.5	389.1	269.3	213.4	133.7	94.5					
*Red Beauty	200.4	332.5	253.4	87.1	70.1	44.0	254.1	239.6		93.3	44.2
*114.49.1x	268.7	287.5	199.7	155.5	152.0	66.2	310.7	295.5		120.5	108.6
*Red Warba							241.8	334.7		231.0	85.1
*Canso							269.3	265.7			85.1
*White Cloud							240.3	261.4		154.7	85.6
L.S.D. CW 1A	52.8	71.1	51.7	27.5	25.8	12.3	39.9	48.6	37.4	50.1	26.4

* Observational single rows of 20 hills each.

Nebraska table 2. Cwt. per acre of U.S. No. 1 Grade, A-size tubers produced in 1958 Nebraska trials.

Variety or Selection Numbers	Western Nebraska (late crop)						Central Nebr.		Eastern Nebraska		
	Irrigated			Dryland			Irrigated		Dryland		
	Scotts Bluff County Exp. Sta.	Sioux County Dutch Flats	Sheridan County Mirage Flats	Box Butte County Exp. Sta.	Sheridan County Gordon	Banner County	Lincoln County Hershey	Dawson County Cozad	Douglas County Omaha Cultivate	Douglas County Omaha Straw Mulch	Dixon County Concord Exp. Sta.
	4020	4200	3830	4020	3500	5300	2900	2450	980	980	1480
	6-13	6-7	6-19	6-7	6-17	6-6	4-22	4-20	4-2	4-2	4-15
	9-29	10-7	10-10	9-25	8-27	10-6	8-20	8-18	8-4	8-4	8-11
	#1	#3	#4	#5	#7	#8	#9	#10	#11 C	#11 M	#12
Four 20-hill plots each variety.											
156.48-2x	202.3	310.6	278.9	214.9	102.2	90.4	313.5	310.6	200.6	221.5	120.2
Progress	162.7	294.8	207.7	119.5	50.7	46.0					
Progress (L)	151.3	321.8	214.2	126.6	65.8	60.5					
Redbake	133.9	210.6	203.0	113.9	58.8	45.2	251.1	208.4	104.8	140.2	85.6
Dazoc	67.9	123.1	239.0	129.4	60.2	37.1	230.8	259.3	134.3	194.6	81.0
Excel	207.6	278.2	232.4	131.7	82.3	64.4	267.1	283.1	238.4	243.8	103.0
R. Pontiac	191.1	306.0	208.6	183.3	100.2	72.3	308.6	365.9	171.1	189.2	97.5
R. LaSoda	182.2	282.4	298.9	208.7	102.2	90.3	309.0	302.0	185.7	199.6	95.7
Redkote	170.9	308.0	209.8	167.7	95.2	77.6	237.3	220.8	166.9	166.5	72.5
90.49-1x	176.7	208.8	229.3	155.0	103.0	77.8	263.4	264.6	168.9	229.6	127.9
Haig	204.5	332.3	253.9	163.0	75.6	67.3	234.5	257.6	195.3	188.2	82.6
45.51-3	178.3	370.3	266.5	154.9	92.9	73.9	272.9	291.1	103.9	179.2	58.7
Canso	128.5	193.1	202.0	127.9	70.3	62.2					
Colo. 1224.0	147.4	244.3	207.5	112.0	73.5	61.7					
Single (20-hill) row per variety											
Norland	220.7	294.7	207.7	186.5	88.9	53.9	153.2	196.2		134.1	
Redburt	240.6	107.4	232.9	205.4	101.7	86.3					
Red Beauty	142.5	119.0	161.5	68.8	39.7	33.3	226.8	211.6			
114.49-1x	239.9	256.1	192.1	141.4	95.8	49.4	276.1	249.1		105.2	88.4
Red Warba							134.3	255.0		165.9	
Canso							232.8	245.0			
White Cloud							186.7	236.4		142.9	51.4

Nebraska table 3. Percentage of U. S. No. 1 grade A size in 1958 Nebraska trials.

Variety or Selection Numbers	Western Nebraska (late crop)						Central Nebr.		Eastern Nebraska		
	Irrigated			Dryland			Irrigated		Dryland		
	Scotts Bluff County Exp. Sta.	Sioux County Dutch Flats	Sheridan County Mirage Flats	Box Butte County Exp. Sta.	Sheridan County Gordon	Banner County	Lincoln County Hershey	Dawson County Cozad	Douglas County Omaha Cultivate	Douglas County Omaha Straw Mulch	Dixon County Concord Exp. Sta.
	4020	4200	3830	4020	3500	5300	2900	2450	980	980	1480
	6-13	6-7	6-19	6-7	6-17	6-6	4-22	4-20	4-2	4-2	4-15
	9-29	10-7	10-10	9-25	8-27	10-6	8-20	8-19	8-4	8-4	8-11
	#1	#3	#4	#5	#7	#8	#9	#10	#11 C	#11 M	#12
4 20-hill plots per variety											
156.48-2x	73.9	58.0	84.7	93.4	78.0	85.0	91.2	84.9	84.0	89.1	88.3
Progress	79.2	81.3	78.1	75.7	61.6	78.0					
Progress (L)	74.1	88.0	74.7	77.8	58.3	80.6					
Redbake	76.0	77.7	82.1	84.8	69.3	74.2	85.4	79.4	77.1	90.8	79.0
Dazoc	45.1	41.7	84.8	87.9	69.6	72.1	85.7	87.1	86.6	93.3	79.9
Excel	78.3	70.9	84.4	80.8	71.9	79.7	91.9	87.0	90.3	93.8	85.7
Red Pontiac	66.4	72.8	79.4	91.4	80.9	80.8	92.5	91.3	90.1	92.5	89.2
Red LaSoda	67.8	72.7	84.4	93.4	84.5	93.1	92.7	85.2	79.3	93.0	93.5
Redkote	79.7	89.7	84.0	90.5	76.0	85.6	89.0	81.3	82.4	94.3	88.7
90.49-1x	82.1	65.3	84.2	93.7	85.4	90.3	88.6	80.6	76.4	92.5	89.8
Haig	93.2	91.8	87.9	89.9	75.1	81.7	91.5	85.9	93.3	92.0	88.3
45.51-3	86.0	85.0	82.3	84.3	81.5	88.5	91.1	88.6	85.4	94.3	81.6
Canso	72.1	65.7	80.8	87.0	74.0	80.6					
Colo. 1224.0	78.0	73.4	80.5	88.3	74.5	85.8					
Single row trials-20 hills each											
Norland	84.0	76.6	88.6	97.6	78.5	74.5	92.5	87.2		95.2	
Redburt	78.0	27.6	86.5	96.2	76.0	91.4					
Red Beauty	71.1	35.8	63.7	79.0	56.7	75.8	89.2	88.3			
114.49-1x	89.3	89.1	71.1	91.0	63.1	74.7	88.9	84.3		87.3	81.3
Red Warba							55.5	76.2		71.8	
Canso							86.4	92.2			
White Cloud							77.7	90.4		92.4	60.0

Nebraska table 4. Percentage of U. S. No. 1, A-size tubers that were over 2 5/8 inches diameter, 1958 Nebraska trials.

Variety or Selection Numbers	Western Nebraska (late crop)						Central Nebr.		Eastern Nebraska		
	Irrigated			Dryland			Irrigated		Dryland		
	Scotts Bluff County Exp. Sta.	Sioux County Dutch Flats	Sheridan County Mirage Flats	Box Butte County Exp. Sta.	Sheridan County Gordon	Banner County	Lincoln County Hershey	Dawson County Cozad	Douglas County Omaha Cultivate	Douglas County Omaha Straw Mulch	Dixon County Concord Exp. Sta.
	4020	4200	3830	4020	3500	5300	2900	2450	980	980	1480
	6-13	6-7	6-19	6-7	6-17	6-6	4-22	4-20	4-2	4-2	4-15
	9-29	10-7	10-10	9-25	8-27	10-6	8-20	8-18	8-4	8-4	8-11
	#1	#3	#4	#5	#7	#8	#9	#10	#11 C	#11 M	#12
4 20-hill plots each variety											
156.48.2x	38.7	71.3	56.0	13.2	36.4	20.2	77.3	56.8	60.5	61.1	35.9
Progress	7.7	18.3	14.5	11.0	12.3	1.0					
Progress (L)	15.0	30.0	30.3	6.0	13.8	.9					
Redbake	28.7	37.5	35.0	34.5	19.1	4.6	54.4	39.8	34.0	52.8	32.3
Dazoc	26.7	45.1	46.0	28.8	21.0	2.2	47.0	43.6	48.2	56.0	23.8
Excel	33.3	49.3	47.9	18.7	25.8	2.1	51.6	43.9	48.3	45.2	23.4
Red Pontiac	44.4	77.5	68.0	75.4	45.6	21.0	75.4	64.0	59.2	57.8	57.7
Red LaSoda	44.3	75.6	82.6	74.3	53.3	15.8	74.8	68.9	66.3	74.1	45.1
Redkote	51.5	43.8	54.0	52.4	36.0	6.6	55.5	49.5	60.7	57.4	49.0
90.49.1x	56.4	63.0	63.9	64.5	42.3	28.6	79.0	66.8	68.9	72.7	52.2
Haig	52.4	37.6	58.5	35.1	21.4	4.1	74.0	69.6	59.4	65.0	42.5
45.51-3	31.3	58.1	70.9	43.3	43.7	11.7	71.1	45.5	60.4	44.5	25.4
Canso	29.9	41.6	55.5	36.9	64.6	8.1					
Colo.1224.0	44.2	52.7	50.6	37.4	24.0	5.5					
Single (20-hill) row per variety											
Norland	65.7	49.0	42.5	48.5	15.7	4.8	67.5	53.9			
Redburt	56.3	75.4	84.2	75.6		18.5					
Red Beauty	31.2	60.5	36.6	6.9	2.4		62.7	67.0			
114.49-1x	40.9	52.0	47.0	49.1			57.6	58.2			
Red Warba							69.6	62.4			
Canso							36.1	45.6			
White Cloud							74.6	69.9			66.3

Nebraska table 5. Mean specific gravity of tubers produced in 1958 Nebraska trials. (Values coded by multiplying by 1000).

Variety or Selection Numbers	Western Nebraska (late crop)						Central Nebr.		Eastern Nebraska		
	Irrigated			Dryland			Irrigated		Dryland		
	Scotts Bluff County Exp. Sta.	Sioux County Dutch Flats	Sheridan County Mirage Flats	Box Butte County Exp. Sta.	Sheridan County Gordon	Banner County	Lincoln County Hershey	Dawson County Cozad	Douglas County Omaha Cultivate	Douglas County Omaha Straw Mulch	Dixon County Concord Exp. Sta.
	4020	4200	3830	4020	3500	2900	2450	2450	980	980	1480
	6-13	6-7	6-19	6-7	6-17	6-6	4-22	4-20	4-2	4-2	4-15
	9-29	10-7	10-10	9-25	8-27	10-6	8-20	8-18	8-4	8-4	8-11
	#1	#3	#4	#5	#7	#8	#9	#10	#11 C	#11 M	#12
4 20-hill plots each variety											
156.48-2x	76.8	70.8	80.7	95.0	97.5	89.3	78.0	72.1	65.0	72.5	76.7
Progress	74.6	72.8	75.2	75.7	94.2	83.5					
Progress (L)	77.3	72.5	73.8	77.8	98.6	84.7					
Redbake	79.8	77.7	82.8	84.8	99.3	91.0	79.7	73.2	69.4	77.0	79.0
Dazoc	69.2	73.5	75.8	87.9	94.7	83.8	78.0	69.5	65.9	72.5	77.4
Excel	88.3	77.5	81.8	80.8	100.3	96.3	84.9	79.7	71.8	82.4	88.7
Red Pontiac	68.3	64.3	69.3	91.4	84.3	76.7	70.9	62.7	54.9	64.2	65.9
Red LaSoda	72.3	69.5	75.3	93.4	96.0	89.5	73.0	67.0	58.2	66.4	71.2
Redkote	77.8	71.0	74.7	90.5	95.3	84.3	77.2	66.6	56.4	64.9	68.7
90.49-1x	78.2	75.0	75.2	93.0	94.3	93.5	74.7	67.0	61.7	69.6	79.7
Haig	77.8	76.2	80.0	89.9	98.2	90.3	77.0	72.4	65.7	72.5	76.4
45.51-3	73.7	66.0	68.7	84.3	91.3	85.3	74.9	66.1	57.2	65.2	65.7
Canso	83.8	81.2	85.7	87.0	104.7	98.7					
Colo. 1224.0	83.0	78.2	81.7	102.8	100.4	91.5					
Single (20-hill) row per variety											
Norland	64.5	68.5	71.3	97.6	85.2	84.5	79.0	69.3		62.5	
Redburt	69.3	67.2	79.2	96.2		78.5					
Red Beauty	74.5	73.3	78.7	79.0	90.0	79.0	74.5	70.7			
114.49-1x	93.3	82.0	88.0	108.3	103.0	110.2	86.9	81.3		85.2	85.0
Red Warba							76.0	73.6		69.1	
Canso							88.5	91.2			
White Cloud							71.7	74.3		79.0	77.2

Haig: highest scab resistance of any variety now considered suitable for Nebraska growing; tuber type very good; percentage of large potatoes relatively high; high specific gravity; suitable for chip making if properly managed; yields comparatively satisfactory in all parts of the State; greatest value--appears to be for farms with soils heavily infested with scab.

Redkote: performance mediocre, tuber color only fair; yields and tuber size intermediate; scab less prevalent than with most varieties.

Redburt: lacked in tuber color, type, size and specific gravity.

Red Beauty: red tubers of excellent type; yields low; specific gravity median and tuber size median.

Norland: excellent type, dark red tuber; yields usually too low; tubers satisfactory size; specific gravity median.

Canso: yields too low; scab very prevalent, specific gravity among the highest.

Nebraska table 6. Scabby potatoes of A-size, as percent of total yield, in 1958 in two trials where scab was very prevalent.

Variety or Selection	Scotts Bluff Co. Trial 1	Sioux Co. Trial 3	Variety or Selection	Scotts Bluff Co. Trial 1	Sioux Co. Trial 3
156.48-2X	18.5	27.0	90.49-1X	10.6	22.1
Progress	5.1	4.6	Haig	0	.4
Progress (L)	2.2	3.9	45.51-3	0	0
Redbake	13.1	10.5	Canso	18.8	20.5
Dazoc	44.8	41.5	Colo.1224.0	0	.4
Excel	14.5	23.9	Norland	6.4	20.4
Red Pontiac	17.4	8.4	Redburt	10.4	67.0
Red LaSoda	19.2	13.9	Red Beauty	21.7	59.8
Redkote	4.5	.5	114.49-1X	1.2	0

c. Promising advance selections:

156.48-2X--which will probably be released for commercial production in 1959. (Name--Bounty), has been the most productive red variety in most Nebraska trials. The tubers are almost as large as those of Red Pontiac and Red LaSoda, but of far better type and much higher specific gravity. It has been most distinctly superior in western Nebraska but has also been one of the best in the warmer parts of the State.

90.49-1X: tubers very dark red, almost spherical, very large; quite susceptible to scab; vines have high heat resistance.

114.49-1X: very high heat resistance; unusually high specific gravity and high scab resistance; tuber color medium to light red; tubers may be suitable for chipping.

45.51-3: tubers very bright, smooth, white, very good type, intermediate size; unusually high scab resistance; yields sufficiently high to warrant giving it careful consideration.

Colorado 1224-0: tubers medium size, good type, very high specific gravity and relatively free of scab; yields median or low.

2. Utilization - quality tests:

   a. Chip and dry raw slice color: Chipping quality was determined with potatoes of most varieties tested in all the comparative trials. The standard technique was to fry even weight samples for 3 minutes at 375°F. at the start and 350°F at the close of the period. Uniformity of sample origin was assured by cutting slices from longitudinal wedges cut at successive frying times out of each of 20 tubers of each variety, and taking approximately the same number of slices from each tuber. Color ratings were estimated for samples of finely crushed chips arranged in a gradient series. Reconstitution was usually for 3 to 7 weeks between 65-72°F., usually 70-72°F. (Data, Nebraska tables 7 to 9).

(1) Quality of potatoes produced at low temperatures in western Nebraska:

In the 1957-58 trials chips were made from eight varieties grown at six places. The tubers of three of these places were held at relatively higher temperatures (mostly 55-60°F) for the first three weeks after harvest, whereas those of the other three plots were subject to some chilling during that time.

In 1958 chips were made from tubers of ten to twenty-three varieties grown in the six western trials. Storage was similar to that in 1957. Results: Data for 1957 are summarized in Tables 6, 7 and 8, but some conclusions are based on 1958 trials, the data for which have not all been assembled as yet.

a. Chip quality:

   (1) Location of production caused most variation in chip color and differences were highly significant. This location effect was a combination of maturity and initial storage factors (Nebraska Tables 7,8). Very high color values of Sheridan County dryland trial are attributed to nearly complete maturity of all varieties in that plot. Very low values of Banner County dryland tubers were due to their extreme immaturity.

   (2) Lack of constantly warm temperature continually following harvest resulted in chips of poorer color with each variety from each of the plots involved. (Early storage involved some chilling with potatoes from Sheridan and Box Butte dryland and Sheridan irrigated trials; with other storages no chilling occurred.)

Nebraska table 7. Means of color ratings of chips of varieties from western Nebraska locations 1957. (Each mean of variety x place with 3 chipping times, crushed chips arranged in gradient series. 1/

Variety or Selection	Banner Dryland	Scotts Bluff Irrig.	Sioux Irrig.	Sheridan Irrig.	Box Butte Dryland	Sheridan Dryland	Mean of Variety
			Estimated chip color (gradient basis)				
Haig	5.17	4.87	5.53	5.70	6.80	7.90	5.99
Dazoc	4.80	3.27	5.33	5.90	7.20	8.93	5.95
Redbake	4.67	4.53	4.63	6.30	7.17	7.67	5.83
315.48-3x	4.37	5.07	4.90	5.03	7.20	8.13	5.78
Progress	2.73	3.60	4.60	4.27	5.63	7.90	4.97
Excel	3.10	2.70	4.27	5.03	5.73	8.70	4.92
156.48-2x	3.73	4.00	4.47	4.20	5.30	7.73	4.91
215.50-2	3.37	2.90	4.33	3.80	5.33	6.93	4.45
Place	3.86	3.87	4.76	5.03	6.30	8.02	5.33

1/ L.S.D.'s for variety, 0.34; for location, 0.32; for variety x location, 0.84.

Mean of Rd values of chips.

Haig	16.17	17.27	17.61	18.22	22.94	27.87	20.01
Dazoc	15.63	8.37	15.80	17.29	25.03	32.70	19.14
Redbake	15.54	16.77	13.33	23.55	29.30	25.48	20.11
315.48-3x	15.28	15.77	14.55	18.01	22.72	29.09	19.27
Progress	8.96	10.16	14.85	12.67	18.67	28.25	15.59
Excel	10.91	9.35	14.22	14.55	19.26	30.09	16.39
156.48-2x	12.70	13.93	15.62	12.95	17.22	28.35	16.79
215.50-2	11.83	11.04	14.35	13.07	18.05	25.02	15.56
Place	13.42	12.85	15.04	16.29	21.23	28.36	17.84

1/ L.S.D.'s for variety, 1.28; for location, 1.10; for variety x location, 3.12.

Specific Gravity (actual value x 1.000)

Haig	81.0	82.2	68.0	80.3	84.3	91.0	81.1
Dazoc	79.2	70.0	66.5	75.0	81.2	85.3	76.2
Redbake	86.5	84.8	69.0	83.2	89.7	94.0	84.5
315.48-3x	82.8	82.3	71.5	81.0	82.7	96.7	82.8
Progress	72.2	79.8	65.5	74.8	78.8	92.5	77.3
Excel	82.2	80.7	67.0	78.2	92.5	103.7	84.0
156.48-2x	80.2	77.0	73.0	82.2	82.3	94.3	81.5
215.50-2	78.0	85.0	77.0	80.3	84.7	91.3	82.7
Place	80.3	80.2	69.7	79.4	84.5	93.6	81.27

Nebraska table 8. Means of color ratings of chips by varieties and 3 chipping times, 1957. (Each mean of variety x place x time is based on 18 samples of crushed chips). 1/ 2/

Selection	Mean Gradient Estimate of Chip Color — Time of Reconstitution			Rd-(Gardner-Hunter) Reconstitution Time		
	3 weeks	5 weeks	7 weeks	3 weeks	5 weeks	7 weeks
Haig	5.20	6.05	6.40	17.96	20.98	21.09
Dazoc	5.07	5.20	6.60	15.43	20.80	21.17
Redbake	5.40	5.67	6.42	17.88	20.45	21.99
315.48-3x	5.35	4.00	6.63	18.07	18.54	21.18
Progress	3.98	4.85	5.20	12.31	17.03	17.44
Excel	4.15	5.20	5.42	13.28	17.79	18.10
156.48-2x	4.28	5.23	5.22	13.48	18.73	18.18
215.50-2	3.90	4.73	4.72	13.13	16.73	16.81
$\bar{x}$	4.71	5.41	5.87	15.19	18.88	19.50

1/ All potatoes were held at about 40-43°F. from early November to January 15. They were then treated with sprout inhibitor and moved to 70-72° storage for the remainder of the time. See note table for comments on places.

2/ L.S.D. for time 0.80.

(3) Variety means differed greatly and F values indicated a high degree of significance in the differences. The four varieties that had high color values with little difference were Haig, Dazoc, Redbake and 315.48-3X. Those of Progress, Excel and 156.48-2X (Bounty) were similar, but at a non-acceptable level. The mean of 215.50-2, a smooth long red selection, was distinctly low.

(4) The interaction of variety and location was highly significant. Chips of acceptable or better rating were produced by all varieties at one location (Sheridan County dryland). From the Box Butte dryland trials the chips of four varieties were good. From only one other (Sheridan irrigated) were means of chip color up to border-line rating for acceptability.

(5) Color of chips improved with all varieties as reconstitution time was prolonged and these differences were highly significant. There was significant interaction between variety and reconstitution time. With all varieties Rd values increased greatly during the 3 to 5 week period. Those that had highest final period ratings continued to improve in color with time whereas little or no improvement occurred with those given lowest ratings.

b. Specific gravity values of tubers when above 1.085 was a dependable criterion of chip color (Nebraska table 5). For example: tubers of varieties from Trial 7 (Sheridan dryland) produced good to excellent chips with Rd values of 25 or higher. These had mean specific gravity values of 1.085 or higher; six varieties, 1.091 or higher. Contrariwise, specific gravity means of all varieties of Trial 3 (Sioux irrigated) were between 1.0655 and 1.077 and Rd values of their chips were between 13.33 and 17.61 - none of them commercially acceptable.

c. Color of raw dry slices varied from very dark gray to very light gray or creamy white color (Nebraska table 8). Variance analyses revealed high F values for varieties, locations and reconstitution time, but there were no significant interactions (Nebraska table 9). The relative order of values for both varieties and locations differed considerably from those with chips. Values were highest with dryland culture but maturity of tubers had little influence. Specific gravity or chip quality seemed to have little or no relation to raw dry slice color. (Progress, with highest mean color estimate of 5.34 and second in mean Rd reading - 19.40 - had chips of very poor color). Darkening of raw slices increased greatly as reconstitution time was prolonged. The means for all varieties and places were:

Weeks of reconstitution	Color estimates gradient order	Rd reading
3	4.72	18.81
5	4.20	19.89
7	3.93	16.57
LSD	.26**	.80**

Nebraska table 9. Means of color ratings of raw dry slices of varieties from western Nebraska location, 1957. (Each mean of variety x place is based on 3 chipping time samples).

Variety or Selection	Banner Dryland	Scotts Bluff Irrig.	Sioux Irrig.	Sheridan Irrig.	Box Butte Dryland	Sheridan Dryland	Variety
	Color estimate-gradient with pulverized samples						
Haig	6.07	4.03	2.03	3.97	5.97	6.63	4.78 1/
Dazoc	5.30	3.20	1.73	2.73	4.10	4.90	3.66
Redbake	5.43	3.03	1.67	3.70	4.10	5.50	3.91
315.48-3x	5.20	3.67	1.93	3.43	4.77	7.03	4.34
Progress	7.20	3.67	3.07	3.97	6.13	8.03	5.34
Excel	6.20	3.76	2.00	3.30	6.67	8.03	6.01
156.48-2x	5.90	3.13	2.13	3.90	4.67	7.33	4.51
215.50-2	5.00	2.37	1.00	1.77	2.53	3.70	2.73
Place	5.80	3.36	1.95	3.35	4.88	6.40	4.285

1/ L.S.D.'s for variety, 0.40; for location, 0.34.

Rd color values (each mean based on 3 times, duplicate readings.)

Haig	21.10	18.33	12.03	17.56	22.19	28.78	19.30 2/
Dazoc	20.18	13.33	12.72	15.23	18.35	21.04	16.81
Redbake	21.45	15.23	11.27	15.74	16.96	20.65	16.88
315.48-3x	21.34	18.13	14.50	16.66	20.61	21.94	18.86
Progress	23.53	16.57	12.66	15.90	21.38	26.39	19.40
Excel	25.15	18.70	12.24	16.50	26.16	30.54	21.54
156.48-2x	24.07	14.93	13.09	17.46	18.48	26.52	19.08
215.50-2	19.94	13.60	11.68	13.37	16.49	17.98	15.51
Place	22.10	16.10	12.52	16.05	20.08	23.71	18.43

2/ L.S.D.'s for variety, 1.30; for location, 1.12.

(2) With tubers produced under high temperature conditions in central and eastern Nebraska (1957 and 1958, harvested in August) in 10 trials during 3 years at 4 locations:

(a) Those of most varieties were suitable for making satisfactory to excellent chips. Most reconstituted well after chilling, the chip quality sometimes being slightly better after than before reconstitution.

(b) The chip making classification of varieties or selections of major importance or promise was:

Excellent	Very Good	Good	Acceptable	Poor	Very Poor
Redbake	Dazoc	Excel	Redkote	Red LaSoda	Red
156.51-2(W)*	Sheridan	Norland	Red Warba	Redglo	Pontiac
	181.51-2	95.48-1	Redburt	Red Beauty	
	Haig (W)	156.48-2X	Early Gem(W)		
	302.50-5(W)*	315.48-3X			
		White Cloud(W)			
		77.51-2 (W)*			

* All of these were red tuber varieties except those indicated (W).

b. Suitability of Nebraska grown selections or varieties for dehydration and granule manufacture was determined with potatoes of six varieties grown in western Nebraska with irrigation by means of pilot tests at the Fruit and Vegetable Laboratory of the Western Research and Development Division of the U.S.D.A., under the direction of Dr. William F. Talburt. The general conclusion from these tests concerning the various lots tested was:

For dehydrated dice: all were suitable in texture and flavor. With regard to color of the dice: Very good----------Haig
Good---------------Redbake, Progress
Marginal-----------Excel, 156.48-2X, 315.48-3X

For granule manufacture (three tested):
Equal to commercial samples:
Redbake: very promising, flavor very good, color deficient.
Haig: promising, (low reducing sugar good quality for granule use.)
Inferior to commercial samples:
Excel: slightly inferior.

C. Release of new variety in 1959:

It is anticipated now (January 8, 1959) that selection 156.48-2X will have been released to certified seed potato growers for seed increase before this report is circulated. This selection has been the most productive in 3 years of testing in widely separated Nebraska trials and was one of the most productive in the 1958 North Central Cooperative

trials. The tubers are large, intermediate red color and are blocky, thickly oblong. The specific gravity is above median. Culinary quality has been good and, when tubers are properly grown and unchilled, good chips have been made from them. It is anticipated that certified seed stocks of this selection will be commercially available in October, 1959.

II. Development of homozygous parental lines especially for scab and heat resistance (Contributing project to NC-35: Potato improvement through parental line breeding).

A. Scab resistant parental lines:

1. Analysis (pedigree exploration) of Nebraska collection to determine sources of scab resistance.

The combined data for scab reaction of several hundred selections in the Nebraska program in 3 to 15 field plots (1 to 5 years) were tabulated in sequential order from Class 5 to Class 1. The pedigree of each clone of Class 3 or less was diagramed back to the fifth or sixth generation, and examined for parental sources of scab resistance.

Nebraska line 59.41-P_1 (Hind. x Colorado 1485R) was a common source of resistance in approximately 30% of the clones. Derivatives of 59.41-P_1 crossed with Hindenburg, Jubel, Arnica, Cayuga, Menominee or Ontario were common sources of resistance in an additional 30% of the clones. Higher resistance was obtained from combinations of 59.41-P_1 with Hindenburg, Jubel or Arnica than from other combinations.

The remaining clones represented more diverse parentages with 3 or 4 of the Jubel and 59.41-P_1 derivatives as sources of resistance. Derivatives of 59.41-P_1, which transmitted a high degree of resistance, were 143.49-1 (59 x A), 86.49-1X (59 x Minn 43 (Jx15-2) and 154.49-3 (59 x Cayuga). Minnesota 5-10 resistant lines (3 to 5 generation inbreds) were common parents in the early generations of 60% of the clones.

The most promising parental lines were developed by crossing Minnesota inbreds (3 to 5 generations) with line 59.41-P_1. Highly resistant selections (Class 1 and 2) from the progenies were then crossed with Jubel, Arnica or Hindenburg. Recombinations of segregates of these progenies brought 59.41-P_1 into the lines in both sides of the pedigree plus one or two Jubel derivatives.

2. Red skin scab resistant parental lines:
Dark red skin color has been combined with a high degree of scab resistance by combining line 117.43-3 (Minn 36-2 Hind.x Tri. x 49.40-1 Minn 5-10-3-23-2 x Minn 6) with resistant lines developed in the manner described. Combining segregates from progenies of these crosses has brought line 117.43-3 into both sides of the pedigree and intensified color. Lines thus developed sere selfed (first and second generations) and crossed in 1958. Progenies will be studied to determine apparent genotype of the parents.

Russeting and/or over-browning of the periderm has accompanied the combination of red color with scab resistance. Two hundred and fifty families in the seedling plots were screened in 1958 in an attempt to locate parents that transmitted bright red color--free of periderm defects--to their progeny. Genotypes for skin color are being determined for the selected parents utilizing data obtained from seedling tubers of crossed and self progenies.

3. White skin scab resistant parental lines:
White scab resistant lines have been developed largely as a by-product in the manner described (A.1.), so the most desirable lines have arisen from 59.41-P_1 derivatives crossed with Cayuga (Hind x Kat) and Ontario (Hind x Kat) or their derivatives, notably Haig (Cayuga x Minn 43 Jubel x 15-2), 29.47-2 (Ontario x 101.40-3), 25.47-7 x (101.40-3 x Cayuga) and 45.47-5 x (Cayuga x 120.40-6). These parental clones and their derivatives were selfed (first, second and third generations), sibbed, and crossed in 1958.

4. Scab reaction in first year tests with 1956 and 1957 progenies (1958):
Lines derived from crosses between 59.41-P_1 (Hind x Colo 1485R) and Hindenburg, Jubel, Arnica, Cayuga and Menominee were selfed, sibbed and crossed. The first year clonal generation of the 37 progenies were tested in scab plots at two locations in western Nebraska in 1958 (Nebraska Table 10). The results indicate that the scab reaction of progenies grown under severe scab conditions (Mitchell Valley) was more severe but proportional to that of the same progenies grown under moderate scab conditions (Scotts Bluff Exp.Sta.). A high percentage of the progeny were classified as type 2 or less when resistance was derived from 59.41-P_1 in both parents. This was particularly true when the other grandparent was Arnica, Jubel or Hindenburg. Crosses between parental type 1 (parents of diverse origin) resulted in higher progeny resistance than that of selfs or sibs of the same parents. Progeny resistance generally decreased as the resistance of one or both parents utilized in crosses decreased.

B. Heat Resistance:

1. Development of heat resistant parental lines:
Utilizing the initial genetic data obtained and reported in 1957, the following hypothesis regarding the inheritance of resistance of heat and heat induced drouth was formulated and was the genetic basis for the breeding methods and development of parental lines in 1958.

   a. Selection for resistance or susceptibility is possible within heterozygous populations of *Solanum tuberosum*.
   b. Dominant genes for susceptibility are involved in the inheritance.
   c. The mean level of heat resistance of progenies can be increased by inbreeding resistant lines.
   d. Further increase in resistance can be obtained by hybridizing inbred resistant clones.

Nebraska table 10. Summarized data for such reaction of 1956 and 1957 progenies grown in scab plots at 2 locations in 1958.

Cross	Type of Parental Resistance	Scotts Bluff 1/ No. Tested	Scotts Bluff 1/ Progeny Mean	Scotts Bluff 1/ Class 2 or less Pct.	Mitchell Valley 2/ No. Tested	Mitchell Valley 2/ Progeny Mean	Mitchell Valley 2/ Class 2 or less Pct.	Source of Resistance 3/
4.57	1 x 1	45	1.80	73.3	23	2.22	52.2	59,Ax59,H
1.57	1 x 1	18	1.33	94.4	7	1.71	85.7	59,Jx59,A
86.57	1 self	11	2.00	72.7	4	3.25	25.0	59,J
37.57	1 self	22	1.72	81.8	7	3.42	28.6	59,H
7.57	1 x 1	11	1.46	100.0	3	2.34	33.3	59,Ax59,59
22.57	1 x 2	25	1.52	88.0	16	1.94	68.8	59,Ax59,C
56.57	1 x 2	52	1.52	88.5	21	2.05	61.9	H,59xJ,H
25.57	1 x 2	7	1.43	100.0	17	2.53	52.9	C,Jx59,C
36.57	1 x 2	15	1.87	80.0	3	3.67	0.0	H,59x59,C
3.57	2 x 1	12	1.75	75.0	8	2.13	75.0	M,59x59,A
10.57	2 x 1	11	1.55	81.8	-	-	-	Minn 5x59,A
42.57	2 x 1	17	1.71	76.5	8	3.63	25.0	Minn 5x59,H
38.57	2 x 1	24	1.42	87.5	13	3.15	30.8	J,HxH,59
12.57	3 x 1	7	1.29	100.0	10	1.90	60.0	59x59,A
39.57	3 x 1	9	1.67	100.0	11	1.91	72.7	S.chac x59H
9.57	4 x 1	26	2.00	69.2	17	3.24	29.4	Jx59,A
41.57	4 x 1	29	2.52	48.3	14	4.86	7.1	Jx59,H
57.57	2 self	33	1.55	93.9	-	-	-	JxJ,H
92.57	2 x 2	25	1.32	96.0	3	2.33	33.3	J,HxH
96.57	2 x 2	22	1.82	77.3	7	2.86	14.3	Minn 5xH
30.57	2 x 2	16	1.31	100.0	10	2.60	33.3	HxM,59
31.57	2 x 2	7	1.86	71.4	4	3.50	25.0	C,AxM,59
91.57	2 x 2	6	1.17	100.0	2	1.00	100.0	J,JxH
148.57	2 self	16	1.75	81.3	-	-	-	Minn5xMinn
35.57	4 x 2	6	4.17	0	3	3.67	0	J,JxO
95.57	4 x 2	24	1.79	79.2	12	2.92	16.7	JxS.chac.
1956 Families,- 4 hills of each segregate								
194.56	1 self	13	-	-	-	2.54	47.2	CxC
89.56	1 x 2	13	-	-	-	2.54	53.8	59,Jx59,M
193.56	1 x 2	24	-	-	-	3.67	16.7	59,Hx -
169.56	2 x 1	42	-	-	-	2.98	33.3	J,Jx59,H
12.56	2 x 2	9	-	-	-	3.44	11.1	H,CxO
94.56	2 x 2	13	-	-	-	3.69	15.4	J,Jx59,M
99.56	2 x 2	22	-	-	-	2.50	50.0	J,Ax59,M
46.56	4 x 1	3	-	-	-	4.00	0	- x59,J
198.56	4 x 1	19	-	-	-	3.21	31.6	CxC
15.56	4 x 2	35	-	-	-	4.09	8.6	CxO

1/ Scotts Bluff Exp. Sta. - Moderate Scab - Suscept. Check-reading 1 to 3.
2/ Mitchell Valley - Severe Scab - Suscept. Check - reading 3 to 5.
3/ H = Hindenberg A= Arnica J = Jubel C = Cayuga M = Menominee
59 = Hind x, K5 O = Ontario (K5 in this instance was Colorado 1485R).

2. <u>Breeding procedures to test the hypothesis</u>:
Eight clones selected for a high degree of heat resistance in heat machine tests were carried into the first and second generations of selfing and crossed for determining general and individual combining ability.

A highly resistant and an extremely susceptible inbred clone were selfed and crossed and used as tester parents (male) with three highly resistant heterozygous parents. The progenies were grown from true seed and heat-machine tested.

3. <u>Results of heat-machine tests of progenies</u>:
Results obtained in heat-machine tests of first and second generation inbred progenies and test crosses are given in Nebraska Table 10. The mean level of resistance of the self and cross progenies of the resistant (104.52-2) and susceptible (140.47-1) inbred parents agreed favorably with the 1957 data for these progenies. The mean level of resistance of the selfed progeny of the resistant parent exceeded that of the susceptible parent. The resistance of the cross progeny was intermediate. These results support the formulated hypothesis.

The results obtained with the crosses between resistant heterozygous parents and the inbred resistant (104.52-2) and susceptible (140.47-1) tester parents, plus the self progenies of the heterozygous parents are presented in Nebraska Table 11 and summarized in Nebraska Table 12. The data from these progenies provided further genetic implications regarding the nature of inheritance of heat resistance. As seen in Nebraska Table 12, the mean level of resistance, of progenies of the selfed heterozygous resistant parents exceeded that of the same parents crossed with either the inbred resistant or susceptible tester parent as well as those of selfed tester parents. The mean level of resistance of progenies of the crosses with the susceptible tester parent exceeded that of the crosses with the resistant tester which is a direct reversal to expectations.

The combined results of the selfed and test cross progenies (Nebraska Table 12) indicated the heterozygous resistant parents possess and transmit a higher degree of resistance than the inbred resistant parent in test crosses with the inbred susceptible. The mean level of resistance of the individual test cross progenies were proportional to the mean level of resistance of the progenies of selfed resistant parents.

The resistant parents were utilized as females in all test crosses which would suggest the possibility of a maternal influence in inheritance in crosses with the susceptible tester[1/]. However, in crosses between the heterozygous resistant parents and the resistant inbred tester, the male inbred tester parent exhibited a controlling influence on resistance of progeny as indicated by the progeny means.

1/ Fryxell reported that the inheritance of osmotic value and the associated resistance to cold with tomatoes was found to be controlled by both gene and maternal inheritance. Susceptibility is dominant to resistance. <u>Fryxell, Paul A</u>. A procedure of possible value in plant breeding. Agronomy Journal 46(9) 433-434, 1954.

Nebraska table 11. Frequency distribution of 1958 seedling progenies tested for resistance to heat (greenhouse heat machine tests).

Cross No.	Type of Parental Resistance	Parents: Female	Parents: Male	Progeny Resistance Frequency 1/: 1	2	3	4	Total 1/ No. Tested	Index of Resistance: Mean	Index of Resistance: 1 and 2 Pct.	Average Plant Height (in.)	Estimated Leaf Size 2/
11.58	1	3/104.52-2	Self 2nd.Gen.	7	3	3	8	22	2.57±0.29	33+14=47	7.18	1.73
				5/11	8	10	3	32	2.16		15.25	1.59
52.58	4	4/140.47-1	Self 2nd Gen.	1	2	1	4	8	3.00±0.21	12+25=37	4.25	1.00
				5/4	7	9	12	32	3.14		13.90	1.81
	1 x 4	104.52-2	140.47-1	16	14	22	34	86	2.86±0.12	19+16=35	9.74	2.26
				5/10	7	9	6	32	2.57	31+22=53	16.53	2.12
32.58	1	133.53-1	Self	5	2	1	0	8	1.67±0.20	62+25=87	6.50	1.37
13.58	1 x 1	133.53-1	104.52-2	8	6	3	13	30	2.70±0.24	27+20=47	7.27	2.53
49.58	1 x 4	133.53-1	140.47-1	18	7	3	2	30	1.63±0.13	60+23=83	5.50	1.97
74.58	1	114.49-1x	Self	17	8	3	3	31	1.70±0.18	55+26=81	7.10	2.19
18.58	1 x 1	114.49-1x	104.52-2	1	2	2	4	9	3.00±0.21	11+22=35	7.56	2.44
54.58	1 x 4	114.49-1x	140.47-1	30	27	10	8	75	1.90±0.11	40+36=76	6.99	2.60
14.58	2 x 1	84.51-1	104.52-2	2	3	5	3	13	2.79±0.17	15+23=38	8.38	3.46
50.58	2 x 4	84.51-1	140.47-1	7	4	0	3	14	1.93±0.23	50+29=79	6.36	2.29

1/ 1 = slight leaf damage (resistant); 2 = moderate leaf damage, slight stem damage (resistant); 3 = severe leaf damage, moderate stem damage (susceptible); 4 = severe leaf damage, severe stem damage (susceptible).
2/ 1 = approximately 5 sq. inches; 5 = approximately 25 sq. inches.
3/ Resistant 1st. generation inbred.
4/ Susceptible 1st generation inbred.
5/ 1957 data.

aska table 12. Comparative data from progenies of heterozygous heat resistant and inbred tester parents, 1958.

Parent	Type of Parental Resistance	Selfed Progeny			Crosses with 104.52-2 1/			Crosses with 140.47-1 1/		
		Mean Resis-tance	Mean Plant Height (in.)	Mean Est.Leaf Size	Mean Resis-tance	Mean Plant Height (in.)	Mean Est.Leaf Size	Mean Resis-tance	Mean Plant Height (in.)	Mean Est.Leaf Size
104.52-2 2/	1	2.57	7.18	1.73	-	-	-	2.86	9.74	2.26
140.47-1 3/	4	3.00	4.25	1.00	-	-	-	-	-	-
133.53-1	1	1.67	6.50	1.37	2.70	7.27	2.53	1.63	5.50	1.97
114.49-1x	1	1.70	7.10	2.19	3.00	7.56	2.44	1.90	6.99	2.60
84.51-1	2	-	-	-	2.79	8.38	3.46	1.93	6.36	2.29
Mean 4/	-	1.68	6.80	1.78	2.80	7.44	2.81	1.82	6.28	2.29

1/ Male parent
2/ Inbred resistant parent
3/ Inbred susceptible parent
4/ Heterozygous resistant inbred crosses only.

As previously reported[1/], resistance to heat was inversely proportional and correlated to plant height, 20 percent of the variation between clones being explained by the correlation. Consequently, the relationship between mean plant height and resistance of progenies was studied. As seen in Tables 10 and 11, the mean plant height and estimated leaf size of the progeny of the inbred susceptible tester parent selfed were considerably smaller than those of the progenies of selfed heterozygous resistant parents, which in turn were smaller than those of the progeny of the selfed inbred resistant tester parent. The plant height and estimated leaf size of progenies of crosses between heterozygous resistant parents and the inbred resistant tester, greatly exceeded those of the progenies of the crosses with the inbred susceptible parent. These results would suggest the possibility of a close relationship between the factors which influence resistance to heat and general plant vigor. Such a possibility is in agreement with the findings reported by Fryxell.

C. <u>Development of lines with resistance to multiple characters</u>:

1. <u>Scab resistance and heat resistance</u>:
   Several parental clones that were found to be highly resistant and utilized as parents in developing parental lines also possess a high degree of scab resistance. Resistance to scab within these clones was developed in the manner previously described (3.a.1.). The most resistant clones are: 77.51-2, 104.52-1 and 106.52-3 (first generation inbreds); 133.53-1 and 84.51-2.

2. <u>Scab, heat and late blight resistance</u>:
   First year clonal blight resistant progenies screened and selected from progenies of crosses between late blight resistant and combined scab and heat resistant parents in 1957 were grown in a seedling plot in 1958. The most horticulturally promising selections from these progenies will be field tested for scab resistance and greenhouse tested for heat and late blight resistance. Clones which possess a combination of two or more of these characters will be utilized in the parental line development program, by inbreeding and backcross procedures.

3. <u>Scab, heat and virus-X resistance</u>:
   Field selections from progenies of 1957 crosses between scab and heat resistant and/or virus-X immune clones were made in the 1958 scab test plots. The scab resistant selections will be greenhouse tested for heat and virus-X resistances. Clones possessing a combination of characters (two or more) will be utilized in the parental line development program.

1/ O'Keefe, R. B., Preliminary report of physiological and genetic studies of resistance to heat in Solanum tuberosum. Presented at the annual meeting of the American Potato Ass'n. of America, August 1958.

NEW HAMPSHIRE
Paul T. Blood

Twenty-three seedlings and varieties were grown in a yield test at Northwood, New Hampshire, on Paxton soil, with approximately 1,600 pounds of an 8-12-12 fertilizer low in chlorine applied per acre. Each plot consisted of 2 rows, 20 feet long, planted within a randomized block and replicated 4 times. Seedspacing in the row was 10 inches for all varieties. The test was planted May 22, tops were killed September 11, and the tubers were harvested September 26.

All samples for chipping were cooled to 40°F. before conditioning and were fried December 16 after conditioning 14 days at 80°F. Cottonseed oil at 375°F. was used as a frying medium. The results are presented in New Hampshire table 1.

New Hampshire table 1. Yield, total solids, and chipping quality of 23 potato varieties grown in New Hampshire, 1958.

Variety	Yield per acre Over 2"	Yield per acre Under 2"	Solids	Chip color rating 1/
	Cwt.	Cwt.	Pct.	
Saco	277	28	22.7	G
#10 2/	269	18	21.2	E
Teton	261	29	20.4	A
Kennebec	260	20	21.4	E
Green Mountain	238	45	23.4	A
Merrimack	230	25	23.2	G
1.14 3/	230	67	21.3	G
43-R-50 3/	229	53	19.9	G
Russet	228	54	22.0	-
Rukat	227	54	20.4	-
Rushmore	226	16	19.7	-
46 121	218	42	22.1	E
Plymouth	212	19	20.5	-
Delus	210	10	23.2	G
Early Gem	203	24	17.6	-
Cherokee	200	34	21.1	-
Canso	197	28	21.8	-
47-47 3/	188	52	20.9	-
Katahdin	180	21	20.3	G
F 451	164	65	22.0	G
B 932-9	156	67	23.9	E
Norland 4/	133	38	19.1	-
Cobbler	127	68	21.4	G

1/ Chip ratings: E, excellent; G, good; A, acceptable.
2/ Virus-X-free Kennebec.
3/ Alaskan variety.
4/ One plot planted late.

NEW JERSEY

John C. Campbell

Three variety tests were conducted under the direction of the Plant Pathology Department of the New Jersey Agricultural Experiment Station.

An extensive test was located on the farm of Simonson Bros. at Cranbury, another test was conducted in cooperation with Seabrook Farms, Bridgeton, New Jersey, and a demonstration test was located on the Ketcham Bros. farm at Freehold.

Chip color of the various varieties was determined by Vitold Racenis of the Food Science Department and French fry quality, of the varieties grown at Seabrook Farms, was determined by the Research Division of Seabrook Farms.

Simonson Experiment: Thirty-two named varieties and 19 USDA seedling varieties were planted in the test on the Simonson farm. Twenty-five of these varieties were replicated 4 times three varieties were in duplicated plots and the seedlings were not replicated.

Each plot consisted of two rows 49 feet long planted on sassafras sandy loam with a pH of 5.2. The seed was spaced 8 inches apart in 36-inch rows. The test was planted on April 16 and 17. Two replicates of each variety were hand-planted and 2 were machine-planted. 2400 pounds of a 5-10-10 fertilizer was applied at planting and no sidedressing was used. Rainfall was adequate most of the season, however, approximately 3 inches of water were applied through irrigation. The experiment was harvested on September 17, 24, and 25 after all varieties were mature (New Jersey tables 1 and 2).

Seabrook Test. Twenty varieties were planted by hand in the test at Seabrook Farms. Seed was spaced 10 inches apart in single row plots 34 inches wide and 40 feet long. A ton of 5-10-10 fertilizer deriving the potash from sulfate of potash was applied per acre. The test was planted April 25th and harvested on July 28 and August 21 soon after the varieties were mature. Chemical weed control ($1\frac{1}{2}$ gals./acre Sinox P.E. in 40 gals.) was applied May 6, 1958.

After harvest, potatoes of each variety were graded, specific gravity determined and processed into French fries and frozen by Seabrook Farms Research Department. They were removed from the freezer and prepared for eating on December 17. A panel of 8 men evaluated the prepared French fries for color, flavor, and texture. The results are indicated in New Jersey table 3. Several varieties made desirable French fries and these will be planted in acre plots this year.

Seabrook Farms uses several thousand sacks of potatoes each year and they are anxious to find a variety that will make good French fries when grown locally.

New Jersey table 1. Potato variety test, Simonson Bros. Farm, Cranbury, N.J., 1958.

Variety	Seed Source	Yield per acre1/ Total	U.S. No.1	U.S. No.1	Total Solids	Chip Color2/ July 31	Oct. 7	Mat.3/	Remark
		Bu.	Bu.	Pct.	Pct.				
Huron	Canada	904	696	77	18.3	6	10/	L	15% B's, 4
Saranac	USDA	805	523	65	13.1	9	10/	VL	22% B's, 1 culls, 1%
Kennebec	Maine	760	646	85	16.7	4	4	L	9% B's, 2%
Gr. Mountain	Maine	730	569	78	17.9	6	9	L	8% B's, 12
Pungo	Maine	701	624	89	17.4	4	5/	EM	4% B's, 6%
Red LaSoda	Wisc.	694	589	85	14.8	6	9/	ME	7% B's, 7% & kn.
Chippewa	Maine	679	591	87	15.5	3	5	M	9% B's, 1%
Saco	Maine	676	466	69	15.7	7	7	L	12% B's, 1
R. Burbank	Maine	661	336	59	17.4	4	5	L	14% B's, 2
Boone	USDA	622	572	92	15.5	9	6	L	5% B's, 1.
Onaway	Mich.	597	537	90	14.8	9	9/	E	8% B's, 1%
Katahdin	Maine	587	534	91	16.2	4	5/	L	8% B's
Dazoc (red)	Neb.	573	470	82	15.3	5	5/	E	11% B's, 4 & g.c.
Plymouth	N. Y.	562	523	93	16.9	6	4/	M	4% B's, 3%
Plymouth	Maine	545	512	94	16.9	6	4/	M	4% B's, 1% & kn.
Merrimack	Maine	532	463	87	17.4	4	5/	L	5% B's, 6% & g.c.
Irish Cobbler	Maine	474	398	84	16.9	6	5	E	12% B's, 1
Rushmore	Wisc.	466	372	80	16.0	4	4/	EM	7% B's, 1 scab & kn.
Red Beauty	Wisc.	464	362	78	14.3	9	9/	M	15% B's, 1 scab & poo shape
Rushmore	Maine	464	380	82	16.0	4	4/	EM	8% B's, 8% & scab
Delus	Maine	428	407	95	18.4	4	6	L	3% B's, 1 & rot
Keswick	Maine	426	391	92	18.2	4	6	ML	5% B's, 1
R. Sebago	Maine	418	343	82	15.7	5	5/	L	11% B's, & rot
White Cloud	Neb.	413	335	81	15.3	5	4/	E	15% B's, scab
Norland	Minn.	409	344	84	14.8	6	10	E	10% B's, & kn.
Antigo	Wisc.	389	362	93	16.0	5	4	ME	5% B's
Tawa	Wisc.	330	264	80	15.3	4	5	E	15% B's

1/ All yield data is average of 4 replicates.

2/ Color rating according to National Potato Chip Institute color chart. Nos. 6 and acceptable, over 6 - not desirable, over 8 - not acceptable. July 31 - only early varieties mature; October 7 - after harvest, all varieties mature.

3/ E - early, M - mid-season, L - late.

4/ kn. - knobby, g.c. - growth cracks, Mat. - indicates maturity season.

Jrsey table 2. Potato variety test, Simonson Bros. Farm, Cranbury, N. J., 1958.

ey	Seed Source	Yield per acre: Total	Yield per acre: U.S. No.1	U.S. No.1	Total Solids	Chip Color[1] July 31	Chip Color[1] Oct. 7	Mat.[5]	Remarks[5]
		Bu.	Bu.	Pct.	Pct.				
bank (" spacing)	Maine	610 [2]	445	73	17.4	4	5	L	11% B's, 11% kn.
	Neb.	560 [2]	465	83	17.9	6	6+	ML	12% B's, 1% kn.
	Neb.	458 [2]	394	86	14.6	5	5+	EM	11% B's
	USDA	915 [3]	814	89	14.3	6	9	L	6% B's, 3% g.c. & kn.
c	USDA	733	330	45	13.1	9	10+	L	33% B's, 22% culls
	USDA	718	603	84	16.9	7+	5+	L	11% B's, 1% kn.
	USDA	627	545	87	17.3	6	8	L	10% B's, 2% dumbbell
th	USDA	609	579	95	16.9	6	4+	M	3% B's
ack	USDA	563	411	73	17.4	4	5+	L	12% B's, 11% kn.
	USDA	461	392	85	18.4	4	6	L	7% B's, 6% soft rot
a	USDA	454	372	82	16.7	5	4+	L	10% B's, 2% poor shape
	USDA	450	383	85	16.2	6	5+	EM	11% B's, 4% culls
	USDA	350	263	75	15.3	4	5	E	13% B's, 4% g.c.
13(red)	USDA	932	736	79	14.3	7+	10+	L	17% B's, slight rot
	USDA	756	665	88	17.2	6	9	VL	6% B's, 5% kn.
	USDA	692	526	76	15.5	9	8	L	13% B's, 8% kn. & soft rot
-4(red)	USDA	673	478	71	15.7	7+	7	M	17% B's, 6% kn. & soft rot
	USDA	658	566	86	15.3	5	6	M	9% B's, 1% rot
	USDA	643	527	82	13.9 [4]	7+	6	EM	10% B's, 5% kn. & soft rot
-2(red)	USDA	622	529	85	16.0	5	4+	L	11% B's, 1% very rough skin
-24	USDA	567	499	88	15.5	5	5+	L	8% B's, 1% kn.
-30	USDA	563	456	81	15.3	7+	6+	ML	15% B's, 2% kn.
-36	USDA	506	425	84	14.6	7+	10+	EM	10% B's, 3% g.c.
	USDA	495	396	80	16.7	4	5	L	13% B's, 1% g.c.
-14(red)	USDA	476	352	74	14.3	5	7	M	21% B's
-26	USDA	427	371	87	14.1	7+	10	E	7% B's, 3% soft rot
-20	USDA	393	354	90	15.3	4	6+	M	8% B's
6	USDA	363	298	82	15.5	6	5+	E	11% B's, 4%g.c. & kn.
-41	USDA	355	270	76	15.5	4	4	E	15% B's, 1% poor shape
	USDA	333	290	87	16.0	6	4+	E	2% B's, 8% g.c.

New Jersey table 2. (Continued).

B2162-36(red)	USDA	314	166	53	17.7	4	4	L	28% B's, culls & 1% rot
B3427-7	USDA	310	198	64	15.3	6	8	E	27% B's, culls

1/ Color rating according to National Potato Chip Institute color chart. Numbers 6 a below - acceptable, over 6 - not desirable, over 8 - not acceptable. July 31 - on early varieties mature; October 7 - after harvest, all varieties mature.

2/ Average of 2 replicates.

3/ One plot only of all USDA varieties and seedlings.

4/ Lower than previous year, probably an error.

5/ E - early, M - mid-season, L - late. kn. - knobby, g.c. - growth cracks, Mat. - indicates maturity season.

New Jersey table 3. Potato variety test, 1958 in cooperation with Seabrook Farms Company, Seabrook, New Jersey.

Variety	Harv. Date	Yield per acre Total Bu.	U. S. No. 1 Bu.	U. S. No. 1 Pct.	Total Solids Pct.	French Fry Evaluation[1/] Color	Texture	Flavor
Early Maturity								
Onaway	8/21	622	558	90	15.7	4	4	4
Rushmore	8/21	480	452	94	15.5	4	5	4
Dazoc	7/28	462	347	82	16.1	1	4	4
Cobbler	7/28	471	348	74	17.6	1	2	1
Tawa	7/28	383	338	86	15.9	5	4	4
White Cloud	7/28	392	315	80	16.9	3	2	2
Midseason Maturity								
Chippewa	8/21	615	510	83	15.7	1	4	2
Pungo	8/21	598	495	83	17.8	3	2	2
Keswick	8/21	501	455	90	18.4	3	3	2
Plymouth	7/28	472	427	90	16.7	1	4	3
Antigo	8/21	462	398	86	16.3	5	3	4
Late Maturity								
Kennebec	8/21	696	565	81	17.1	1	3	2
Saco	8/21	712	545	76	17.3	2	2	3
Green Mountain	8/21	605	525	87	20.0	2	2	2
Katahdin	8/21	552	492	89	15.0	2	3	3
Boone	8/21	580	473	82	15.0	3	4	3
Merrimack	8/21	533	437	82	17.6	2	2	2
Delus	8/21	443	400	90	17.8	2	3	2
Rukat	8/21	473	342	72	15.7	3	4	4
Russet Burbank	8/21	465	326	70	17.3	2	2	3

1/ 1 -- Excellent (outstanding)
2 -- Better than average
3 -- Average or normal
4 -- Poorer than normal
5 -- Poor (Rejected)

Ketcham Test. A variety demonstration test was located on the Ketcham Bros. farm at Freehold. Twenty-two varieties were planted in 2-row plots approximately 300 feet long. Seed was spaced 8 inches apart in 34 inch rows and 2500 pounds of a 5-10-10 fertilizer were applied at planting.

Because of continued rains the ground was too wet to plant until May 15. The seed was cut early in April and some lots did not keep well resulting in decayed seed pieces or weak plants. This resulted in some poor stands and poor yields, particularly in the case of the New York source of Plymouth and the Tawa. Most of the late maturing varieties produced relatively low yields because the vines were killed several weeks before they were mature due to serious late blight infection in some varieties.

Early Maturing Varieties. Among the early maturing varieties, the Onaway, Rushmore, and Antigo produced higher yields than did Cobbler although they did not equal Cobbler in table quality. The Onaway is resistant to scab and late blight. Rushmore is susceptible to scab and the Antigo is reported to be scab resistant. The Norland and Tawa produced very low yields. While Dazoc and White Cloud produced a fair yield they are susceptible to scab.

Midseason Maturing Varieties. The Pungo may be harvested early enough to be considered with the early maturing varieties in which case it would be considered superior to the other early varieties in both yield and table quality. It usually matures with Chippewa and has produced yields equal to Chippewa in 10 tests since 1954 and produces a much better cooking potato than Chippewa and it also makes good chips and better than average French fries. In addition it is resistant to late blight. I would recommend this variety for farmer trial. The only seed available is in Maine.

The Plymouth is also a good quality midseason variety and although it did not produce as well as the Pungo this year it has equalled Pungo in several previous tests and is still worth consideration as a midseason variety. Keswick will be dropped from future trials.

Late Maturing Varieties. The Huron produced the exceptionally high yield of 904 bushels total and 696 US ones in the Simonson test and a fair yield in the Ketcham test, although it was killed long before maturity and we plan to plant a larger quantity this year.

The Kennebec also produced a very good yield at Cranbury and Bridgeton. It also produced high yields in 1954 and 1957. This variety makes very good chips and French fries. If handled carefully this variety has many fine qualities and has been widely accepted in other states and now ranks fifth in the quantity of seed certified in the United States.

Boone is a vigorous growing variety with an upright type of growth. Yields have not been equal to Katahdin but cooking quality is slightly better.

Saco, although producing a relatively high total yield, develops many poorly shaped tubers, however, it might be acceptable for processing.

Merrimack has good table quality and also makes good chips and French fries but does not equal Katahdin in yield. This is also true of the Delus variety. Rukat does not seem to be adapted to New Jersey conditions and produced relatively low yields.

The Green Mountain, although producing a relatively low percentage of U.S. ones, continues to produce a good yield of salable potatoes.

Russet Burbank does not produce a high enough percentage of U.S. ones to be considered as a commercial variety unless a special market is developed which will pay a somewhat higher price for this variety. Wide spacing will improve percent of number ones. When spaced 16 inches apart, 79% were U.S. ones but when 8 inches apart only 59% were U.S. ones in the test at Simonsons.

In addition to these varieties, we planted smaller quantities of 14 other varieties and 19 seedlings furnished by the USDA. Among this group, the Teton, Houma, and Mohawk produced 814, 603, and 545 bushels of U.S. ones per acre respectively. These varieties were released by the USDA several years ago but have never been widely accepted for various reasons. The table quality of Teton is not very high but the Houma and Mohawk are of excellent quality.

The seedling B69-16 produced 665 bushels per acre of U.S. ones and it has good table quality and made fair chips. It is a late maturing variety resistant to late blight and we hope to secure more seed for a larger test this year. B355-35 is another seedling that has produced good yields in recent tests. This variety matures in midseason and will be tested further.

Two hundred fifteen other seedlings were hand-planted in 10-hill lots with the purpose of determining if any of them might be adapted to New Jersey conditions. Thirty-two were quite promising and larger quantities will be planted this year. We also plan to plant 75 new seedlings that I selected in Maine last fall.

We hope to find a variety that will be superior to those now being grown. This is not likely to be easy but we plan to continue these tests until one is found.

New Jersey table 4. Monmouth County potato variety test, 1958, Ketchum Bros. Farm, Freehold, New Jersey. 1/

Variety	Source	Yield per acre Total	U. S. No. 1	U. S. No.1's	Total Solids	Remarks 2/
		Bu.	Bu.	Pct.	Pct.	
Early Maturing						
Antigo	Wisc.	483	444	92	15.0	
Irish Cobbler	Me.	455	396	87	16.5	
Rushmore	Me.	427	376	88	14.6	
Onaway	Mich.	508	366	72	15.0	13% B's, 10% g.c.
White Cloud	Neb.	443	359	81	15.3	15% B's
Dazoc (red)	Neb.	345	290	84	14.3	8% B's, severe l.bl.
Norland (red)	Minn.	299	206	69	14.8	25% B's
Tawa	Wisc.	209	153	73	14.8	17% B's
Midseason Maturing						
Chippewa	Me.	541	460	85	14.8	
Pungo	Me.	521	443	85	17.7	5% kn.
Plymouth	Me.	408	347	85	15.7	
Keswick	Me.	352	317	90	16.5	
Plymouth	N. Y.	256	195	76	15.7	13% B's
Late Maturing						
Katahdin	Me.	480	417	87	14.6	
Saco	Me.	553	359	65	14.1	24% poor shape
Rukat	N. Y.	351	298	85	14.6	
Huron	Ca.	345	293	85	15.3	6% poor shape
Green Mountain	Me.	404	287	71	17.7	13% poor shape
Delus	Me.	347	286	91	18.9	
Merrimack	Me.	311	274	88	16.9	10% B's
Boone	USDA	320	272	85	14.3	5% poor shape
Russet Burbank	Me.	484	232	48	16.5	28% B's, 8% kn.

1/ Planted - May 15, 1958. Harvested - Oct. 10, 1958. 2500 lbs. 5-10-10 fertilizer/A. 8" spacing in 34" rows. Seed cut - April 3-4. Soil very wet at planting.

2/ kn. - knobby, g.c. - growth cracks, l.bl. - late blight.

NEW YORK

Elmer E. Ewing and Ora Smith

Potato variety trials were conducted in four New York counties, in cooperation with the respective County Agricultural Extension Service Agents. All plots were located in commercial potato fields, and were cared for by the growers. Plots in Wyoming, Steuben and Broome Counties were on mineral soils. The fourth experiment was on a muck soil in Wayne County.

Seed of Russet Rural, Red Pontiac, and Sebago was obtained from local certified stock. Certified seed of Dazoc and Redbake was obtained from Nebraska. The seed of 13-35 was received from Dr. K. H. Fernow; the Houma seed was local, uncertified seed. Seed of all other varieties came from the U.S.D.A. Station at Presque Isle, Maine.

Each experiment was composed of four randomized complete blocks. Individual plots consisted of single rows 25 feet in length, except that the plots were only 22 feet long in the Steuben County trial. Rows were 34 inches apart, and there was 8 inches between seed pieces, except as otherwise noted. None of the seed was treated prior to planting.

After taking the total yield, tubers from each plot were graded to U.S. No. 1 specifications, and the weights were recorded for the individual plots. Samples were selected from the No. 1 tubers in each plot for specific gravity determinations; and the specific gravity readings were converted to percentages of dry matter. Selected tubers from a single replication in each experiment were chipped before the potatoes had been placed in storage. Chip color was measured by a Hunter Color and Color Difference Meter. Meter readings above 17.0 are generally considered to indicate satisfactory chip color; readings below 17.0 are considered too dark.

The data for total yields, yields of U.S. No. 1 potatoes, and specific gravities were subjected to analysis of variance. Significant differences among means were determined by Tukey's Test. Those differences exceeding the "D" values given in the respective tables are significant at odds of 19:1. Chip color values represent the means of two determinations.

The 1958 season was extremely wet and cool, and late blight was present in all of the trials. It was most severe in the Wayne County experiment, where it was so serious that the grower killed the vines considerably sooner than would have been otherwise desirable. This, together with a serious infestation of early blight, probably accounts for the low yields and dry-matter contents found in that trial (N.Y. Table 1).

Perhaps also as a consequence of the wet season, tuber greening was more common than usual. Scab was present in the Wayne County and Broome County trials; and air cracking was unusually severe in the other two trials. The response of the individual varieties to these conditions is indicated under "Remarks" in each table(N.Y Tables 1, 2, 3, and 4).

New York table 1. Potato variety trial, Wayne County, 1958 (Muck soil).

Variety	Yield per acre U.S.No.1	Yield per acre Total	U.S.No.1	Solids	Chip color Ave. Rd	Remarks
	Cwt.	Cwt.	Pct.	Pct.		
B 2368-4	232	280	83	18.6	19.0	Deep eyes, growth cracks, second growth, scab, sunburn
Red Pontiac	197	254	78	17.0	12.0	Scab, sunburn, some growth cracks and air cracks
Cherokee	186	249	75	18.9	18.1	Bright skin; more elongated than usual; growth cracks and sunburn
Katahdin	186	248	75	17.2	16.5	High sunburn and scab
Ontario	177	280	63	17.3	13.0	Some second growth (chain tubers); some sunburn
B 3453-2	132	220	60	18.8	13.3	Scabby; light red skin; growth cracks; air cracks
Plymouth	128	208	62	18.2	15.4	Some second growth; a little sunburn
B 920-7	128	196	65	16.9	8.4	Bad growth cracks and air cracks; scabby
Tawa	123	171	72	17.8	19.1	Nice appearance. A little second growth; few growth cracks
Redbake	123	181	68	18.3	16.7	Nice appearance, but not dark red skin. Some scab
Irish Cobbler	108	203	53	17.0	14.4	Deep eyes. Scabby
B 3428-31	33	109	30	16.7	14.7	Russeted. Sunburn. Undersize
D, 5% (Tukey's Test)	80	93		1.4		

Planted on May 13; harvested on October 22.

New York table 2. Potato variety trial, Wyoming County, 1958.

Variety	Yield per acre U.S.No.1	Yield per acre Total	U.S.No.1	Solids	Chip color Ave. Rd	Remarks
	Cwt.	Cwt.	Pct.	Pct.		
B 2368-4	569	666	85	18.0	8.9	Poor tuber shape, oversize, deep eyes, growth cracks
Saco	466	558	84	20.2	16.1	Severe second growth, oversize; some growth cracks
Kennebec	420	503	84	18.5	13.4	Some oversize; some sunburn
B 605-10	387	488	79	17.6	18.3	Many growth cracks; many air cracks, some sunburn
Katahdin	372	417	89	18.7	23.2	High in sunburn
Russet Rural	362	445	81	19.2	23.0	Growth cracks
13-35	325	375	87	18.3	13.1	Some growth cracks, sunburn, air cracks
Delus	303	369	82	19.3	21.1	Ran large; some sunburn; a few growth cracks
Merrimack	272	314	87	19.7	23.5	A little second growth
Redbake	255	293	87	18.0	17.4	Rather small; some growth cracks
B 3427-7	242	328	74	17.7	20.8	Undersize
B 920-7	177	255	69	17.6	17.2	Growth cracks very serious Some air cracks
D, 5% (Tukey's Test)	132	150		1.7		

Planted on May 23; harvested on October 1.
Fertilization: 2500 lbs. 5-10-10 in bands at planting.

Variety	Yield per acre U.S.No.1	Total	U.S.No.1	Solids*	Chip color Ave. Rd	Remarks
	Cwt.	Cwt.	Pct.	Pct.		
13-35	321	369	87	19.4	16.3	
Sebago	318	369	86	18.6	28.9	
Saco	314	370	85	20.0	21.8	Tubers ran large. Some off-shape
Russet Rural	287	331	87	20.3	19.8	
Kennebec	280	348	80	20.1	25.8	
Katahdin	280	331	85	19.0	39.7	
Delus	245	313	78	21.1	22.8	Many with sunburn
Russet Burbank#	231	300	77	20.1	21.8	A little second growth
B 2368-4	215	276	78	17.8	21.6	Rough appearance; deep eyes; growth cracks; some air cracks
Plymouth	205	269	76	19.4	17.8	
Redbake	189	233	81	19.4	23.3	Nice, smooth appearance
B 605-10	187	268	70	19.3	26.2	Growth cracks, sunburn, air cracks
B 3427-7	182	245	74	18.3	16.6	
Merrimack	180	224	80	20.3	27.2	
Irish Cobbler	166	215	77	20.3	24.2	Many with sunburn
D, 5% (Tukey's Test)	134	125				

* Specific gravity determinations were performed on only two replications in this trial
# Russet Burbank seed pieces were spaced at 16 inches
Planted May 29; harvested September 24-25
Fertilization: 200 lbs. calcium cyanamid plowed down; 1800 lbs. 8-16-16 in bands at time of planting

New York table 4. Potato variety trial, Broome County, 1958.

Variety	U.S.No.1	Total	U.S.No.1 Pct.	Solids Pct.	Chip color Ave. Rd	Remarks
Red Pontiac	405	480	84	16.2	2.6	Many oversize tubers. Deep eyes, poor shape. Easily bruised during grading.
Kennebec	381	500	76	19.2	4.5	Ran large. Many sunburned. Easily bruised.
13-35	369	472	78	18.1	3.3	Very good appearance;highly uniform size and shape. Little sunburn.
Saco	354	514	69	19.8	3.6	Very severe second growth. Poor shape.
Irish Cobbler	348	424	82	18.5	4.6	Deep eyes. Well shaped for this variety
Plymouth	306	384	80	16.9	2.7	Quite a few oversize tubers. Many hollowhearts.Med.sunburn.
Sebago	304	381	80	18.0	11.2	Generally well shaped. Med. sunburn
Katahdin	298	417	71	18.0	4.2	Tubers ran large. Many sunburned.
Delus	289	394	73	19.6	4.5	Tubers ran large. Good appearance, but many sunburned
Redbake	285	360	79	18.4	10.6	Many undersize tubers. Little sunburn. Nice shape. Easily bruised
Russet Burbank*	260	352	74	19.6	9.8	Some second growth, but appearance generally good. Some sunburned.
Merrimack	239	286	84	19.4	4.8	Rather small. Little sunburn.
Russet Rural	229	272	84	18.0	4.6	1/3 of plants weak or missing due to seed piece decay.
Dazoc#	183	291	63	16.7	3.9	Dark red skin. Deep eyes, rough in appearance, Many sunburned
Tawa	168	263	64	17.5	3.7	Many air cracks. A few over-size. Smooth in general
Houma#	168	236	71	17.4	5.0	Plants were 35% leaf-roll;22% spindle tuber.
D, 5% (Tukey's Test)	129	107		1.5		

* Russet Burbank seedpieces were spaced at 16 inches
\# Dazoc and Houma seedpieces were spaced at 12 inches
Planted June 10; harvested October 30
Fertilization: 300 lbs. ammonium nitrate plowed down;
1400 lbs. 6-12-12 in bands at planting

Of the numbered varieties, only two looked at all promising. 13-35 gave good yields of tubers which were uniform in size and appearance. B 2368-4 gave exceptionally high total yields, but the appearance of the tubers was very poor. The susceptibility of both B 605-10 and B 920-7 to growth cracking and to air cracking would seem to eliminate them from further consideration.

None of the newer varieties was consistently outstanding. Saco, Delus, and Merrimack all had high dry-matter contents. Saco gave excellent yields; but in two of the three locations where it was planted it had a very poor appearance due to oversize tubers, second growth, and growth cracks. Merrimack was satisfactory in appearance; but failed to give good yields. Delus yielded better than Merrimack; but ranked a little below Katahdin in all three locations where it was planted. Delus resembled Katahdin in its tendencies to produce oversize tubers and to develop sun-greening.

Plymouth yielded very satisfactorily for an early variety; and the appearance of the tubers was much superior to that of Irish Cobbler tubers. It was also less susceptible to scab than Irish Cobbler. The principal defects noted were hollow-heart and oversize tubers, especially in the Broome County test. Tawa did not look promising as an early potato for mineral soils. Yields were low, and it was quite subject to air cracking. It will be further investigated as a possible replacement for Irish Cobbler on muck soils.

The chip color determinations presented here are indicative only of chipping performance on the day of harvest. Samples of all varieties are being tested for ability to give light-colcred chips after various storage conditions. Results of these studies will be presented in next year's reports. The dark colors of chips from the Broome County test was probably due to low soil temperatures.

NEW YORK

L. C. Peterson and R. L. Plaisted

The weather at Ithaca like that in most of New York State was characterized by abnormally high rainfall. The result was that yields ranged from low to high being influenced to a great extent by land drainage.

Breeding and the preliminary selections are made in Ithaca. All single hill, 10-hill, increase and replicated yield plots are grown on the University farm. In addition, golden nematode, scab, black spot, yield and quality trials are conducted at the Research Station at Riverhead, Long Island. All advanced seedlings are tested for their specific gravity, after-cooking darkening, and chipping quality.

Other phases of the program consist of growing approximately 20,000 new seedlings as single hills in the field, 800 selections in 10-hill increase plots and 50 in advanced selection plots and replicated yield trials.

Blight: Late blight was generally prevalent throughout New York State. Within the limits of the blight plots in Ithaca, blight infection was more severe than it has been in over a decade. Infection on plots of known genotypes indicate the presence of the following races - 0; 1; 2; 1,4; and 2,4. Only slight infection was found on 2 leaves of R_1R_2 genotype and then only late in the growing season. The majority of seedlings containing the major gene resistance grown in our plots are of the R_1R_2 genotype.

Black spot: Seedlings are grown and stored on Long Island. Bruising and rating for color intensity and internal necrosis are done in mid-winter by the Department of Vegetable Crops. Symptom expression apparently is dependent on a number of factors and testing over a period of years is required in order to obtain reliable results.

Approximately 200 selections were grown for the first time and 66 were selected on the basis of horticultural characters for further bruising tests. Forty selections were grown in a replicated yield plot. Twenty-three of these equaled or exceeded the yield of the standard check and will be tested more extensively next year. Most of these selections in previous tests have satisfactory chips.

Golden Nematode: Tests for resistance are conducted at the Golden Nematode Laboratory at Seaford, Long Island. All seedlings are planted in 4-inch pots and grown in cloth houses. The potting soil is taken from an area of the Laboratory field known to contain a high level of viable cysts. Assays of the potting soil are made to determine whether material should be added to maintain a high concentration of cysts. After 6 to 7 weeks of growth the soil-ball of each seedling is examined and counts made of cysts on roots on the periphery of the soil-ball. Individuals with 5 or less cysts per root-ball are classed as resistant. The reliability of the testing method is indicated by the fact that very few of those classed as resistant in preliminary screening tests are eliminated as susceptible in subsequent tests.

S. sucrense: This species has 48 chromosomes and apparently is closely related to S. andigenum. It crosses readily with S. tuberosum. Progenies with S. sucrense contain various degrees of resistance with a very low number of highly resistant individuals. The genetics of resistance has not been determined but appears to be complicated and more than likely to be multigenic in nature (Peterson table 1.).

Peterson table 1. Golden nematode resistance, 1958.

Source of resistance and type of progenies	Number crosses	Number tested	Number resistant	Number resistance
S. sucrense				
Sucrense inbreds	3	57	42	74
Katahdin x S_3	1	28	5	18
S_3 x Katahdin	1	27	5	19
Sucrense x tuberosum BC_2	11	728	38	5
S. andigenum				
1376 x 1376	1	83	60	72
1376 x tuberosum F_1	2	139	57	41
1376 x " BC_1	34	1854	1011	54
1376 x " BC_2	17	1474	833	57
1380 x " BC_1	18	1064	564	53
1380 x " BC_2	9	607	343	57
S. vernei				
1377 x 1377	2	19	17	89
1377 x tuberosum F_1	6	306	127	42
1377 x " BC_1	3	264	116	44
(1377 x tuberosum) selfed	1	32	12	37
Combined				
andigenum x vernei	2	162	113	70
" x sucrense	9	558	322	58
sucrense x vernei	1	40	13	32

S. andigenum: Several collections have been found to be resistant to the nematode and one of these has been extensively used in the breeding program. In tests conducted on 81 tubers of this clone, only 2 cysts developed on the roots of one plant in comparison to hundreds which developed on the roots of susceptible Katahdin checks. Roughly, half of the progenies of S. andigenum x tuberosum crosses were found to be resistant. This same proportion was maintained in crosses of advanced backcross generations.

S. vernei: This is a 24 chromosome species native to northern Argentina. It is not self fertile, but sets seeds readily when crosses are made between different clonal types. In a few cases, notably Russet Rural and Virgil, some seeds were obtained when crosses were made with diploid vernei. A few of these individuals were found to have fertile pollen and have been used extensively. The genetics of resistance with vernei is under investigation. It may be of

interest that we have observed in crosses among plants of *S. vernei*, segregants which are moderately chlorotic and have bright yellow stigmas. The mode of inheritance of this factor is under study.

Recurrent Selection for Specific Gravity: In 1957 all possible combinations of crosses Delus, Houma, Merrimack, Green Mountain, Saco and Cobbler were attempted. These varieties were selected on the basis of analyses computed for estimating the components variance of specific gravity.

In 1958 the progenies were grown in the seedling field and specific gravity taken on most of the individual hills (Peterson table 2). It is obvious that the means and variances are confounded with environmental effects. However, Katahdin grown as a guard row in the same plots ran about 1.073. Analyses were made of the skewness and kurtosis of two of the larger distributions, Green Mountain x Merrimack and Saco x Merrimack. In neither case was there any reason to suspect a departure from normality. The most promising crosses were Green Mountain x Merrimack and Delus x Merrimack. All selections with a specific gravity greater than 1.079 have been saved and will be planted in 2 8-hill plots, one at Ithaca and the other at Long Island.

Peterson table 2. Estimates of means and standard deviations in units of specific gravity of progenies resulting from the indicated crosses, 1958.

♀ \ ♂	Delus			Merrimack			Green Mountain			Saco		
	No.	Mean	s	No.	Mean	s	No.	Mean	s	No.	Mean	s
Delus	17	1.092	.014	176	1.080	.010						
Houma	54	1.070	.011	246	1.075	.009	30	1.075	.011	115	1.070	.009
Merrimack	12	1.076	.008	85	1.076	.011				59	1.074	.010
G.Mountain	206	1.072	.009	185	1.080	.010				52	1.073	.009
Saco	37	1.075	.012	365	1.074	.009				111	1.072	.010
Cobbler				32	1.074	.011						

Testcross Study: A yield trial of test cross material was conducted at Ithaca and Riverhead, Long Island. This same trial was run at Clear Lake, Iowa, by Dr. A. E. Kehr. The purpose of this trial is to select inbred lines with superior combining ability for yield and to estimate the variation due to the line x tester, tester x location, and line x tester x location interactions. The design of the experiment is a new one devised by Dr. W. T. Federer for nk^2 treatments where k is the number of entries per block and n is a constant. It involves 200 entries in 6 replications at both locations with 10 entries per incomplete block. This analysis is not yet complete.

Rate of Approach to Homozygosity: In an effort to evaluate the rate of approach to homozygosity through inbreeding, 255 plants of 17 different families representing crosses between non-inbred parents were selfed. Only 65 of these produced seed and some of these have failed to produce seedling plants. Thus the loss in the first generation of this random-bred stock is over 75 percent.

NEW YORK (Long Island)
R. L. Sawyer

Potato Variety Trials on Long Island

Of major interest in the potato variety trials on Long Island are: (1) yielding ability and exterior appearance equal to or better than Katahdin; (2) internal quality which the chipper will accept; (3) freedom from heat defects; (4) a long storage life which includes black spot resistance. A good scab resistant variety is needed and in 1958 good blight resistance would have been worthwhile.

Since some growers are spreading the planting season out for better storage life and quality, both an early April planting and a mid-May planting was conducted with all varieties. The results for both plantings are given in New York table 1. There are several entries which should receive careful consideration as mentioned below.

New York table 1. Potato variety trial field results at the Long Island Vegetable Research Farm, 1958.

Variety	U.S.No.1/A Early Planting	U.S.No.1/A Late Planting	U.S.No.1/A Early Planting	U.S.No.1/A Late Planting	Solids Early Planting	Solids Late Planting
	Cwt.	Cwt.	Cwt.	Cwt.	Pct.	Pct.
Merrimack	236	232	230	217	18.8	19.7
B 3427-7	130	132	121	130	16.7	16.8
Kennebec	370	389	309	317	18.5	19.0
Cobbler	238	292	234	281	19.0	17.9
B 3428-41	172	215	173	198	17.9	17.9
B 605-10	281	272	228	242	17.9	18.6
Saranac	350	308	318	295	15.6	16.3
B 926-9	277	293	206	233	15.8	15.5
Katahdin	292	306	244	207	17.9	16.7
Delus	215	262	190	170	20.6	20.1
B 73-3	240	154	225	179	19.5	19.4
B 2368-13	380	298	300	273	17.7	17.9
G. Mountain	390	345	369	319	21.2	20.4
B 2894-24	325	292	275	247	17.4	17.4
Plymouth	264	263	198	223	18.6	18.8
Huron	365	284	337	276	19.0	18.3
Mohawk	308	272	286	233	20.2	19.9
Tawa	208	249	182	197	17.3	17.3
L.S.D. .05	6	8	6	7	.7	.9
L.S.D. .01	8	11	8	9	.9	1.1

Varieties were planted on 2 dates, April 14 and May 17. Seed was spaced 10 inches apart in the row with 34 inches between rows. Plots were fertilized at the rate of 140 pounds of N, P_2O_5 and K_2O, and 50 pounds of M_gO per acre. Plot size was a single row 30-feet long with 6 replications in a randomized block design. Samples will be followed through storage for chipping, black spot, peeled darkening, sprouting and shrinkage determinations. Results for the 1958 growing season are presented in New York table 1 and results for the 1957-58 storage season are in New York table 2.

New York table 2. Storage results for the 1957-58 storage season.

Variety	Shrinkage		Sprouting 1/		Black Spot 2/		Peeled Darkening Index 3/		Chipping Index 4/	
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
	Pct.	Pct.								
Cobbler	7.0	5.0	16	5	30	20	6.2	6.6	4.7	3.0
Plymouth	8.6	7.8	22	12	74	22	7.7	6.6	4.2	6.6
Onaway	5.3	2.7	8	3	55	19	7.7	6.3	3.5	4.3
Cherokee	6.9	5.4	12	10	40	10	4.0	3.0	5.5	6.0
B 926-9	8.8	5.3	8	15	56	17	4.7	3.3	4.0	6.6
Rushmore	-	3.1	-	2	-	17	-	8.6	-	4.4
Saco	8.3	5.6	25	11	58	33	4.7	3.3	3.5	5.3
Canso	6.7	4.2	15	6	45	18	6.0	3.3	6.5	8.0
Katahdin	7.2	5.0	14	8	48	40	4.7	7.3	5.2	5.6
Pontiac	8.9	5.7	22	10	46	15	4.0	5.3	2.7	3.6
Delus	7.4	3.1	20	5	73	22	6.2	7.6	6.5	7.6
Mohawk	5.3	3.4	15	6	57	6	6.7	8.3	4.2	6.6
Kennebec	6.2	3.0	9	3	52	14	5.2	4.6	6.0	7.0
Sebago	8.2	5.7	14	8	42	10	4.5	4.3	6.5	7.6
59576	8.6	4.1	24	5	72	46	5.5	6.0	5.2	6.3
Huron	-	5.9	-	7	-	53	-	7.3	-	4.0
R. Burbank	5.1	3.1	9	1	27	16	6.5	6.0	3.2	3.6
Gr. Mountain	8.1	3.2	18	3	51	26	6.2	7.0	2.7	4.0
47156	8.6	5.9	20	12	62	40	2.5	2.6	5.2	7.0
Merrimack	6.0	4.0	4	4	46	22	3.7	3.3	6.2	6.3

1/ Grams of sprouts per kilogram of tuber
2/ Index scale: 0 - 90 taking into consideration percent showing blackening and intensity.
3/ Index scale: 1 - 9 with 1 indicating no discoloration. Color index made 1 hour after abrasive peeling.
4/ Index scale: 1 - 9 with 9 light and 5 the darkest possible for commercial acceptance.

Merrimack definitely has better internal quality than Katahdin, but it continues to yield about 100 bushels per acre less than Katahdin. Since no extra premium is paid for internal quality, this variety is again not considered satisfactory for recommendation.

Plymouth continues to have a similar ability for yield and internal quality as Cobbler. It is slightly later maturing but has a better external appearance than Cobbler. Growers should try this variety on a small scale as a possible replacement for Cobbler.

As an early planting Huron yields better than Katahdin and has a better internal quality. This variety also looked promising in the 1957 trials. It does not look as promising for late plantings, probably due to its late maturity. The quality of this variety was sufficient to be acceptable to the processing industry and is recommended for small grower trial as a possible replacement for Katahdin.

Although Kennebec has not increased in importance on Long Island as it has in other sections, results indicate that this variety can be grown successfully.

Both early and late plantings yielded considerably better than Katahdin and had an internal quality acceptable for processing.

Of the new varieties tested, Delus comes the closest to approaching Green Mountain internal quality. It's yielding ability is so inferior that it is out of the realm of consideration until there is a considerable premium for internal quality.

Green Mountain continues to remain at or near the top in both yield and quality in cool growing seasons. Growers who grade and market their own potatoes, and have roadside outlets might do well to reconsider this variety and publicize its premium baking quality. Careful control of watering and killing when it starts to go off shape can eliminate a large portion of the heat defects.

Storage results for the 1957-58 storage season clearly indicate better storage life with late plantings. Black spot and shrinkage were lower and chipping color was better. All varieties had a high black spot index, but Russet Burbank appears less susceptible than most varieties. Merrimack, Sebago, Delus and Canso appeared to have better shipping properties than the other varieties tested. In general, black spot was lower with the late planting, but this did not hold true for Katahdin.

NORTH CAROLINA

F. L. Haynes

The 1958 evaluations of new varieties and breeding lines were conducted at 5 locations in the early section and at 3 locations in the mountains. Maintenance and primary selections are conducted at the mountain locations. Primary evaluations for the early commercial area are conducted at Plymouth, and advanced trials are located at Aurora, Camden, Columbia and Faison. Results of three of the advanced trials are presented in N. C. tables 1 and 2.

Chipping quality was rated by a panel. Those varieties reported as excellent in chipping quality scored high in the ratings of color, flavor, texture and in yield of chips. The breeding line 50B33-3 continued to exhibit the characteristic of slow accumulation of reducing sugars when subjected to cold storage. This line can be stored at 55°F. for four weeks without appreciably reducing its chip color rating, a characteristic not found in the commercial varieties grown in the area.

Breeding for resistance to southern bacterial wilt (Pseudomonas solanacearum) is being continued. The level of resistance in the breeding lines has been increased but is not yet at a practical level. It is thought that near-immunity is necessary because of the nature of the disease.

North Carolina table 1. Advanced trial of seedlings at two locations in eastern North Carolina, 1958. Plot size 1/196 acre, 4 replications, randomized block design.

	Camden		Aurora			
Variety	U. S. No. 1/A	Total Solids	U. S. No. 1/A	Total Solids	Chipping Quality	Maturity
	Bu.	Pct.	Bu.	Pct.		
53C2-3	606	16.0	522	16.4	Poor	E
48B13-5	602	15.1	557	15.5	Poor	E
53C3-7	601	17.1	497	16.7		M
Plymouth	598	19.4	427	19.4	Excellent	E
50B9-8	593	16.2	476	16.5	Poor	ML
50B13-1	574	15.7	585	15.9		M
54D3	563	15.9	501	16.2		M
50W3-3	505	18.1	422	18.4		ME
Cobbler	488	18.7	470	18.1		ME
53C10-11	487	19.5	401	18.0		ME
47B3-1	481	16.0	530	16.7		E
50B33-3	456	17.2	563	16.9	Excellent	E
52B60-4	451	17.7	393	17.8		M
50B9-2	447	17.2	444	17.7		E
50B21-1	446	18.1	407	17.6		ME
50B9-5	433	17.6	467	18.4		ME
50W2-1	425	19.6	407	19.9	Excellent	E
50B10-5	423	15.6	427	15.8		ME
49B6-5	395	18.4	432	17.9		M
Sebago	383	16.9	388	16.4	Good	L
L.S.D. .05	81		55			
.01	108		73			
C. V. (yield)	11.5%		8.3%			

North Carolina, table 2. Advanced trial of seedlings at Columbia, N. C., 1958. Plot size 1/196 acre, 4 replications randomized block design.

Variety	U. S. No. 1/A Bu.	Total Solids Pct.	Chipping Quality	Maturity
53C2-5	458	14.8		ME
53C6-2	411	15.2		M
50B9-8	394	15.8	Poor	ML
53C2-3	392	15.7	Fair	E
Plymouth	321	17.4	Excellent	E
50W3-3	321	16.7		ME
Sebago	318	15.2	Excellent	L
50W2-1	304	16.7	Excellent	E
53C6-9	303	14.7		E
50B43-2	294	16.0		E
53C10-11	292	16.9		ME
53C3-7	290	15.0		M
Cobbler	276	16.7		E
Delus	240	19.4		M
53C1-8	219	14.0		M
L.S.D. .05	70			
.01	93			

Coef. variability (yield) 15.2%

NORTH DAKOTA

Robert Johansen, A. P. Benson, E. P. Lana, and Cosimo Cotrufo

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as reported in the 1951 report.

Potato Crossing Program

Two hundred and ninety-two potato crosses were made in the greenhouses during March and April. Crosses made included resistance to late blight, scab, and virus X and Y.

Greenhouse and Field Seedlings

Approximately twenty thousand seedlings representing 210 families were grown in 3-inch pots in the new horticulture greenhouse. These seedlings were transplanted in July and August and harvested in November and December. Of these seedling families 89 were inoculated with a virulent strain of virus X and 135 families were inoculated with the "O" race of late blight. Several families possessed a high degree of resistance or immunity to these diseases.

At the Langdon Experiment Station approximately 18,000 seedlings from 179 families were grown in the field for selection. Approximately 600 clones were selected at harvest for further study and increase.

Advanced selections

Six hundred and thirty-two advanced selections were grown under isolation from virus and other diseases at the Langdon Experiment Station. Seed harvested from these stocks will be used for further increase and testing. Additional samples of most of these selections were grown in scab and adaptation plots at Grand Forks, Northwood, Park River, and Fargo. Sixty-two selections and varieties from other States and Canada were grown at Grand Forks.

In 1958, ND 3324-2, ND 3501-3 Russ, F 29-1, and ND 3631-6R were distributed to foundation growers. The most promising advanced selections grown in 1958 were ND 3324-2, ND 4122-2, ND 4121-25, ND 3631-6R, F 29-1, ND 3740-11, and ND 3815-1R. These selections will be distributed to foundation seed growers in 1959.

Summary of selections and seedlings grown and those saved for further study follows

Age of Clone	Number grown	Approximate No. saved
1st year seedlings	20,000	600
2nd year selections	467	132
3rd year selections	36	36
4th year and older selections	79	62

Testing for Disease Resistance

Scab and silver scurf - One hundred and forty advanced selections were grown in plots at Northwood, Park River, and Fargo. In addition, 17 selections from the National scab trial and several selections from the USDA and Minnesota were grown in the scab nursery at Northwood and Fargo. Readings recorded at Fargo were mostly of superficial to pitted-type scab, while at Northwood and Park River, the strain of *Streptomyces scabies* causing russet-type scab and silver scurf, *Spondylocladium atrovirens* was the most prevalent (North Dakota Table 1). For the past several years it has been a general practice to screen all selections for silver scurf, as well as common and russet scab.

Several clones from USDA and North Dakota families expressed some resistance to silver scurf and russet scab; however, further testing of these clones will be necessary. Breeding for resistance to russet scab and silver scurf has proven to be quite complex. North Dakota selections expressing good resistance to common scab and moderate resistance to russet scab were ND 4122-2, ND 4121-25, ND 3676-5, ND 3740-11, ND 3913-5R, ND 3919-2, and ND 4033-13R.

Virus X - 152 second year clones selected in 1957 and 28 older selections were tested in March and April 1958 for immunity to virus X. Of these selections 122 second-year selections and 23 of the older selections were found to be immune to virus X.

Virus Y - One hundred ninety six clones derived from ND selection 457-1 and its S_1 and S_2 lines grown under field conditions for reaction to virus Y found 66 exhibiting no primary or current season symptoms. Forty-six of these showing no symptoms have been tested for at least 3 years. Of these clones, ND 3324-2, ND 3815-1, and ND 3980-5 show promise as new varieties, and the former excellent possibilities as a parent. ND 3980-5 is a backcross to 457-1. To test a possible linkage or correlation of virus X immunity with field resistance from virus Y, 205 selections showing immunity to X were planted, of which 147 did not have any background to virus Y field resistance. Seventeen of 119 X-immune clones showed virus Y in the field, while 10 of 39 X-immune with virus Y pedigree showed symptoms.

To facilitate testing of new materials, second size seedling tubers of desired crosses were planted. Of approximately 2000 planted 1270 hills were saved for further Y testing.

Greenhouse tests with aphid feeding were not conclusive. Feeding injury caused by aphids made determinations very difficult for true Y simptoms. Attempts were made to obtain a rapid chemical test for virus. Chromatographic, precipitation, and colormetric tests were used. Tests were promising but not conclusive. It appears that a better control of temperature and variation in the extraction procedure would be helpful.

Crosses were made to study field resistance and genetic reaction to virus Y, and for the possible combiantion of Y resistance with clones containing other important disease resistant factors. Outcrossing, selfing and backcrossing were used.

North Dakota table 1. Scab readings of North Dakota, Minnesota, and USDA Selections Grown at Northwood, Park River, and Fargo, 1958.

		Northwood			Park River			Fargo		
Pedigree	Parentage	A-T	Scab rating 1/	Scurf rating 1/	A-T	Scab rating	Scurf rating	A-T	Scab rating	Scurf rating
ND 3935-1S	457-1 x Minn 24	5-2	1.5	5	1-2	4.5	5	4-1	3.5	4
ND 3947-1R	2067-1 x 2910-1R	4-1	2.5	3	2-2	3	3.5	2-3	2	3.5
ND 3950-4R	2124-16 x B 2876-1	4-1	4	3	1-2	3.5	2.5	4-4	2.5	3
ND 3964-4R	2569-4R x I 1049-4	2-1	4	1	1-1	3.5	3	5-2	2	3
ND 3964-5R	"	5-2	2.5	3	1-1	3.5	3	5-2	1.5	2
ND 3972-2R	2780-8R x B 3131-8	5-2	3.5	2	1-2	3	2.5	5-1	1.5	3
ND 3975-1R	2853-3R x B 2876-1	5-1	3	3	2-1	3	3	3-3	1	3
ND 4127-3R	I 1049-3 x 3185-1R	3-1	3	3	1-2	3	3	2-2	2	3
ND 4149-14S	Early Ohio x Nordak	1-1	3.5	5	T-1	4	5	1-1	4	4
ND 4168-1R	Redkote x Red Beauty	2-2	2	3	2-1	3	3	3-1	3	2
ND 4168-10R	"	5-2	1	4	3-1	2.5	3.5	2-4	2	2
ND 4168-12R	"	5-1	2.5	2	3-1	2.5	3	5-1	3	3
ND 4171-2R	Redkote x 2853-3R	5-1	2.5	2	3-1	2	2	4-1	4	3
ND 4173-1R	Redkote x Norland	5-1	1.5	2	1-2	3	1	5-1	2.5	3
ND 4173-3R	Redkote x Norland	4-1	2.5	3	1-1	3.5	2	5-1	1.5	2
ND 4173-8R	"	5-1	3	2	1-1	3.5	2.5	5-1	2.5	3.5
ND 4180-2R	Red Pontiac x 2910-1R	5-1	2	3	3-2	2	1	5-1	1.5	3
ND 4180-5R	"	5-2	1	3	4-1	2	2	3-3	2	3
ND 4183-18Russ	Russet Burbank x B 1396N_2	5-2	2	5	1-1	3	5	1-3	2.5	5
ND 4184-1Russ	A 101-12 x Early Gem	3-2	3.5	5	2-2	3.5	5	4-1	3	5
ND 4184-2	"	4-1	3	5	2-1	3	5	3-2	3.5	4
ND 4186-1S	A 101-12 x Nordak	5-1	2	5	3-2	2	5	3-4	2	4
ND 4186-6S	"	5-1	2	5	3-1	2	5	2-3	2.5	3.5
ND 4192-1	A 119-1 x 2475-8	5-2	3	5	1-2	3	5	2-2	3	3.5
ND 4192-3 Russ	"	5-2	3.5	5	2-1	3	5	2-3	2	3.5
ND 4193-1	A 119-1 x 3435-17	4-1	2.5	5	2-1	3	5	3-3	2	3.5
ND 4194-6Russ	A 119-1 x B 1396N_2				2-1	3	5			
ND 4196-3SRuss	A 119-11 x Nordak	3-1	3.5	5	1-1	4	5	2-2	2.5	3.5
ND 4215-1R	B 922-6 x 3023-B-3R	3-1	3	2	1-1	4	1	5-1	2.5	3
ND 4234-2S	B 1396N_2 x Nordak	5-1	2.5	5	1-2	3	5	5-1	2.5	4
ND 4236-1Russ	B 1396N_2 x 3356-5	2-2	2.5	5	2-1	2	5	1-2	4	5
ND 4238-2R	B 2876-1 x 2774-3R	3-2	3	2	3-1	2	3.5	3-3	2.5	3.5

continued

North Dakota table 1, continued

		Northwood			Park River			Fargo		
Pedigree	Parentage	A-T	Scab rating 1/	Scurf rating 1/	A-T	Scab rating	Scurf rating	A-T	Scab rating	Scurf rating
ND 4238-3R	B 2876-1 x 2774-3R	5-1	3	3.5	3-1	2.5	3.5	3-3	3	3.5
ND 4238-4R	"	5-1	2.5	3	4-1	2.5	3.5	2-2	3.5	3.5
ND 4238-8R	"	3-2	4	2	2-1	2	3	5-1	1.5	3
ND 4238-9	"	4-2	2	5	1-1	3.5	5	2-2	2.5	4
ND 4255-4R	I 1060 x Norland	5-1	1.5	1	1-2	3	1.5	5-1	1.5	2
ND 4255-11R	"	5-1	2	3	1-2	3	2	5-1	1	2
ND 4257-1R	I 1060 x 3023-B-10R	4-1	3	2.5	1-1	4	3.5	1-3	2.5	3
ND 4259-6R	I 1060 x 3369-15	3-1	3.5	1	T-1	4	1.5	5-1	1	2
ND 4262-11R	Minn 24 x La 1859	5-2	2.5	3	1-1	3.5	3.5	2-3	2	3
ND 4263-2R	Minn 24 x 2853-3R	5-2	1.5	3	3-2	2	3	5-1	1.5	3
ND 4264-13R	Minn 24 x 3023-B-3R	3-1	3.5	2	2-2	3	3	1-2	3.5	3.5
ND 4271-4	Minn 358 x 3022-29	3-1	4	5	1-2	3	5	3-4	2.5	4
ND 4273-1S	WX 125 x Nordak	4-1	3	5	3-1	2	5	3-1	3.5	4
ND 4278-2R	WX 137 x 2910-1R	5-1	1	2	1-1	3.5	2	5-1	1.5	3
ND 4278-10R	"	4-1	2.5	2	T-2	3	2	5-1	1.5	2
ND 4283-2R	Red Beauty x La 1859	5-1	2.5	3	2-1	3	2.5	5-1	2	3
ND 4283-6R	"	5-1	2	3	1-1	3.5	2	5-1	2	3
ND 4283-8R	"	4-1	2	3.5	2-1	2	2	4-1	3	3.5
ND 4285-2	W 0130.50 x 2910-1R	3-1	3	5	2-1	2	5	1-1	3	4
ND 4285-3R	"	5-1	2	3	2-1	2.5	1.5	2-3	3	2.5
ND 4289-1R	La 1859 x 2910-1R	5-1	2.5	3	2-1	2.5	2.5	1-3	3	3
ND 4289-5R	"	5-2	1.5	3	2-2	2.5	2	1-4	2	2
ND 4289-6R	"	4-2	2	3	3-1	2.5	3	3-1	2	1.5
ND 4289-8R	"	5-1	1	1	2-1	2.5	2	2-3	2	3
ND 4289-14R	"	3-1	3	2	2-2	2.5	2	4-1	3	3
ND 4289-15R	"	4-1	2.5	2	2-1	3	2.5	4-2	2	3
ND 4290-1R	L.D.62-269 x 2910-1R	4-1	2.5	1	1-1	3.5	1	2-3	2	2
ND 4290-3R	"	5-1	2	3	1-1	3	3	4-3	2	2
ND 4290-5R	"	5-1	3	2	4-1	2	2	3-3	2.5	2
ND 4296-2R	$475M_2$ x 3022-29	4-1	3	2	2-1	3	3	3-2	3.5	3
ND 4333-1R	2774-3R x B 3131-8	3-1	3	2	2-1	3.5	3.5	4-2	2	3
ND 4333-9R	"	4-1	2.5	2	2-1	3	2			
ND 4343-1R	Norland x B 2876-1	3-1	3.5	2	2-1	3.5	3.5	5-1	3	3.5

continued

North Dakota table 1, continued

Pedigree	Parentage	Northwood A-T	Northwood Scab rating 1/	Northwood Scurf rating 1/	Park River A-T	Park River Scab rating	Park River Scurf rating	Fargo A-T	Fargo Scab rating	Fargo Scurf rating
ND 4345-3R	2910-1R x 3023-B-3R	4-1	3	2	2-1	2.5	3	5-1	2.5	3
ND 4351-4R	2976-2R x B 3131-8	5-1	2	2	2-1	3	3	4-1	2.5	4
ND 4357-3	3022-18 x WX 143	2-1	4	5	1-1	3.5	5	2-4	2	3
ND 4359-5R	3022-29 x 2910-1R	5-1	2	2	2-1	3	3	2-3	2.5	3
ND 4371-8R	3023-B-3R x B 3131-8	3-1	3	2	2-2	2	3	3-4	2	2.5
ND 4376-1RS	3024-B-10R x 457-1	5-1	1.5	2.5	3-1	2.5	3.5			
ND 4376-2R5	"	5-1	1.5	1.5	2-1	2.5	2			
ND 4378-3R	3024-B-10R x B 3131-8	5-1	2	2	2-1	2.5	2			
ND 4419-2R	3291-1 x Norland	5-1	1.5	2	4-1	3	3	5-1	2	3
ND 4421-2R	3291-5 x Minn 24	5-1	2	2.5	3-1	3	3	4-1	2.5	3
ND 4468-1R	B 2876-1 x La 1859	4-1	3.5	2	3-1	3	3	3-4	2.5	3.5
ND 4475-2R	B 3131-8 x 2910-1R	5-1	3	3	3-1	2.5	2.5	4-2	2.5	3
ND 4481-4R	B $3131N_2$x 2853-3R	5-2	1.5	3	2-1	3	2.5	3-2	2.5	3
ND 4481-5R	"	4-1	1.5	3	2-1	2.5	3	5-1	3	3.5
ND 2910-R-10R	S1 of 2910-1R	4-1	2	2	2-1	3	3	5-1	3	3.5
Redkote-S1	S1 of Redkote				3-2	2.5	3	4-1	3	3.5
ND M 5529-3R	Manoto x Waseca				2-1	2.5	2.5	5-1	2	3
Norland	626 x Redkote	5-2	3	2+	2-1	3.5	3			
Norgleam	S1 of 457-1	2-2	3.5	5	1-4 2-1	3	5	3-3	2	4
Nordak	"	3-1	3.5	5	2-1	3.5	5	4-3	2	4
ND 2774-3R	626 x 799-9	5-2	2.5	3	2-1	2.5	2			
ND 2910-1R	766-9 x 922	5-2	2.5	4	2-1	3	2	3-1	2	3
ND 3022-18	B 606-37 x 457-1	4-2	3.5	5	1-1	3.5	5	2-2	2	4
ND 3023-B-10R	B 606-37 x 922-1	3-2	3.5	4	1-2	3	3	2-2	2	4
ND 3057-4R	Minn 24 x 922-1	4-2	3	4	2-1	3	3	2-2	2.5	2
ND 3152-1	1207-3 x Cherokee	3-2	2	5	1-1	3	5	3-2	4	5
ND 3307-2	Canso x B 991-13	3-1	2	5	2-1	3.5	5	3-2	3	4
ND 3324-2	Kennebec x 457-1	3-1	3.5	5	2-2	3.5	5	2-2	2.5	4
ND 3440-2	2226-2 x B 991-13	1-1	4.5	5	3-1	3.5	5	3-1	2	4
ND 3501-3Russ	Early Gem x S 108	T-1	4	5	2-2	3	5			
ND 3557-2	I 870-1 x 457-1	3-1	3.5	5	3-1	2.5	5	5-2	2	4
ND 3562-5Russ	I 870-1 x S 108	2-2	4	5	1-1	3	5			

continued

North Dakota table 1, continued

Pedigree	Parentage	Northwood A-T	Northwood Scab rating[1/]	Northwood Scurf rating[1/]	Park River A-T	Park River Scab rating	Park River Scurf rating	Fargo A-T	Fargo Scab rating	Fargo Scurf rating
ND 3569-1Russ	I 8167-2 x S 108	3-2	4	4.5	1-1	3	5	4-2	2	5
ND 3631-5R	Neb 20.44-2 x 2200-1R	4-2	3	4.5	1-1	2.5	4.5	2-3	2	3
ND 3631-6R	"	3-2	3.5	3	1-1	4	4.5	3-2	2.5	3
ND 3640-19R	Neb 49.40-1RxRed Beauty	4-2	2	2.5	1-1	3	3	1-3	3	3
ND 3676-5Russ	Russet Burbankx457-1	1-1	5	5	1-1	4	5	2-1	3.5	4
ND 3676-14Russ	"	2-1	3.5	5	2-1	3	5	4-4	1.5	4
ND 3676-20Russ	"	2-1	4	5	1-2	2.5	5	1-1	4	5
ND 3676-25	"	3-1	2.5	5	2-1	3	5	5-1	2.5	4.5
ND 3676-33	"	1-2	4	5	2-1	3	5	2-1	3.5	5
ND 3694-6	$475M_2$ x Nordak	3-1	3	5	2-1	2	5	1-3	3	5
ND 3699-5R	$475M_2$ x 2780-6R	4-1	2.5	4	1-2	3	3.5	2-4	2.5	4
ND 3701-1R	$475M_2$ x NDI 3381-2	5-1	2	2	1-3	2	3	3-1	3.5	4
ND 3707-1R	92.49-2R x B 2368-4R	5-2	3	3	2-1	3.5	4	5-2	2.5	3.5
ND 3740-1Russ	2476-2 x Early Gem	3-2	2	5	1-2	3	5	1-3	3.5	5
ND 3740-9Russ	"	3-1	3	5	1-1	3.5	5	5-2	2	5
ND 3740-11Russ	"	1-1	4	5	1-3	3	5	1-1	4	5
ND 3815-1R	B 2368-4R x 457-1	3-2	3	3	3-1	3	3.5	4-1	2.5	3.5
ND 3906-1R	Redbake x 2124-20R	5-2	1.5	3	3-2	2	3	4-1	2	4
ND 3913-5R	Picha 45 x Red Beauty	2-1	4	4	2-1	3	4	3-3	2	3
ND 3919-2	Early Gem x B $1396N_2$	3-1	4	5	2-1	3.5	5	3-1	3.5	5
ND 3919-10	"	3-2	3	5	1-1	3	5	2-2	2.5	4
ND 3942-3	Nordak x I 801-10	2-1	3.5	5	T-1	5	5	2-3	2.5	4
ND 3959-2R	2475-8 x B 2876-1	4-2	3	2	1-1	4	4.5	3-2	2.5	2.5
ND 3962-8R	2569-4R x B 2876-1	5-2	2	3	1-1	3	3	2-4	2	2
ND 3967-1R	2780-6R x B 2876-1	3-1	3.5	2	1-1	4	4	2-4	1.5	2
ND 3978-3R	2910-1R x Nordak	4-1	2.5	3	1-1	3	4	5-1	1.5	3
ND 3978-6R	"	3-1	2.5	3	1-1	2.5	4	1-4	2	3
ND 3978-12R	"	5-2	2	2	3-1	2.5	3.5			
ND 3980-5	2972-2R x Nordak	2-1	3	5	2-1	3	5	3-3	3	4
ND 4028-1	3291-5 x B 3159-1	3-1	2	5	4-1	2	5			
ND 4033-13R	3295-6 x B 3131-8	1-1	4	3	1-1	3.5	4	3-1	2	2
ND 4049-4	B 595-76 x $475M_2$	3-1	3	4	1-1	3	5			
ND 4066-4	B 2067-133 x Nordak	3-2	3	5	1-1	3	5	5-1	2	4
ND 4066-6	"	3-1	3	5	2-1	3.5	5	3-1	2.5	3.5

continued

North Dakota table 1, continued

		Northwood			Park River			Fargo		
Pedigree	Parentage	A-T	Scab rating[1/]	Scurf rating[1/]	A-T	Scab rating	Scurf rating	A-T	Scab rating	Scurf rating
ND 4077-2R	B 3131N1 x Nordak	3-1	3	3	2-1	3	4	3-1	3	3
ND 4086-1R	B 3131N3 x 2910-1R	5-2	1	3	1-1	3	4	1-4	2.5	3
ND 4091-1R	B 3131N3 x Minn 24	4-2	2.5	3	1-2	2.5	4	2-3	2	3
ND 4097-5	B 3131-8 x 2910-1R	5-2	2.5	2	1-1	3	2.5	5-1	2	3
ND 4121-25	Tawa x Nordak	3-1	3.5	5	1-1	4	5	4-2	2.5	5
ND 4122-2	I 947-W18 x 457-1	1-1	4	5	1-1	4	5	5-1	3	4
ND M5303-7	S 101 x 457-1	3-1	3	5	2-1	3	5			
B 75-4	47562 x 96-28	5-1	2.5	5	2-1	3	5	3-1	3	4
B 3454-14	B 2368-2 x B 2368-17	5-2	2	3	3-2	2	3	3-2	2	3
B 3453-2	B 2368-2 x B 2162-18	3-2	3	4	2-2	2.5	3	4-1	2	3
B 2368-4	Pontiac x B 400-1	5-1	3	3	2-1	3.5	4.5			
Minn 24.48.4-50	Waseca x 12-5	3-2	2	2				3-2	3	2.5
Minn 14-6-2-1	S3 of Hindenburg	3-1	2.5	5				5-1	3	2
Minn 20	False Empire x M 42	5-1	2	5				3-4	4	2.5
Minn 62.50-11-52	2-6-6 x 113.42-1	4-2	3	5				4-1	4	2
Minn 97.55-8-6	S.demissum x 528-170	3-2	2	5						
Minn 528-113	S1 of 528-170	3-3	2.5	5				2-2	4	2
Minn 8-19	S1 of M 804	5-2	1.5	5						
Minn 67.49-3-51	101.44-4 x 47-4	5-2	1.5	5						
Minn 11	Waseca x Menominee	5-2	3	5				5-1	4	2
Minn 528-143	S1 of 528-170	5-2	2.5	5						
Minn 2.3-1-2-1	S2 of two Minn inbreds	3-1	3	5						
Minn 391-8	S1 of Canso	5-1	3	5						
B 3114-67	B 503-70 x B 991-13	4-1	3	4				1-4	3	1
B 3457-2	B 879-1 x B 991-3	2-2	2	1				2-2	3	2
B 4075-1	PI 205623 x Cherokee	4-1	1	1				3-1	3	2
B 4087-5	Early Gem x B 2834-3	3-2	3	4				2-2	3	4
B 4090-1	Kennebec x B 81-40	4-1	2	3				4-1	2	3
B 4090-5	"	4-1	1	4				2-1	3	4
B 4093-2	Menominee x B 881-12	2-1	3	3				2-1	3	3
B 4093-7	"	3-2	2	3				2-1	3	4
B 4093-14	"	2-2	3	4				2-2	2	4
B 4093-15	"	4-1	2	3				3-1	2	2
B 4094-9	Russet RuralxB3310-5	1-2	3	3				1-2	3	3

continued

North Dakota table 1, continued

		Northwood			Park River			Fargo		
Pedigree	Parentage	A-T	Scab rating 1/	Scurf rating 1/	A-T	Scab rating	Scurf rating	A-T	Scab rating	Scurf rating
B 4105-2	792-94 x B 3139-24	4-1	2	3				3-1	2	3
B 4116-5	B 2359-84 x B 2834-3	2-1	2	3				2-1	3	4
B 4119-1	B 2368-4 x B 3186-6	3-1	2	1				2-4	3	2
B 4120-2	B 2834-3 x B 2162-36	1-2	3	1				2-1	4	4
B 4128-14	B 2962-6 x B 2969-15	3-2	2	4				2-4	2	4
B 4130-7	B 3014-10 x B 929-32	4-1	2	4				1-3	3	4
B 4130-11	"	2-1	4	3						
B 4132-14	B 3097-82 x Katahdin	3-1	3	2				1-3	4	
B 4132-23	"	3-1	3	3				1-4	3	
B 4132-25	"	4-1	2	2				2-1	3	
B 4134-24	B 3186-6 x B 3139-24	4-1	1	2				3-1	3	4
B 4134-34	"	4-1	1	2				1-4	2	3
B 4135-2	B 3139-24 x Cherokee	4-1	2	4				2-1	3	3
B 4158-5	B 595-76 x 1376-2	1-1	4	2				2-1	3	2
B 4170-3	B 3139-24 x B 3201-22	3-1	4	3				1-1	4	3
B 4207-1	B 3508-8 x Dyk. 5230	2-1	4	4				1-1	4	4
B 3309-8	B 874-108 x B 2131-3	4-1	3	4				1-4	3	3
B 3454-5	B 2368-2 x B 2368-17	3-1	3	2				2-1	4	4
B 3139-24	B 607-56 x B 402-1	4-1	3	4				4-1	2	3
B 3556-12	B 595-76 x B 24-58	3-1	2	4				1-1	4	4
B 2067-52	Chippewa x B 381-2	2-1	3	4				1-4	4	4
Red Pontiac	Triumph x Katahdin	4-2	1	3				3-4	1	4

1/ Numerical ratings for scab or silver scurf.

5 = 0 - 20 Percent of tuber surface infected with scab or silver scurf.
4 = 21 - 40 " " " " " " " "
3 = 41 - 60 " " " " " " " "
2 = 61 - 80 " " " " " " " "
1 = 81 -100 " " " " " " " "

Investigations are being made as to the nature of resistance of ND 457-1 and its progenies from the entomological standpoint by study of feeding times and stylet penetration, using the aphid, Myzus persicae, (Sulz.) as the vector.

Chipping Qualities

(Chipping test - Early Harvest Trial, 1958)

In 1958 a non-replicated trial of 9 varieties and selections were grown at Grand Forks and Park River and chipped on three dates, August 1, 15, and 30 (North Dakota Table 2). Samples were chipped immediately after harvest and approximately five days following harvest. Chipping quality was determined by using an arbitrary scale of 1-6 (1 dark, 6 light) for chip color and chip yield was calculated as per cent recoverable of peeled-raw-sliced-potato weight.

At both locations the red selections ND 2774-3R produced the lightest colored chips. Norland and ND 3324-2 produced chips lighter in color than the standard chipping varieties, Kennebec and Cobbler. In the same trial, Nordak, Norgleam, and ND 3631-6R produced chips slightly darker in color than Cobbler and Kennebec.

Cobbler and ND 2774-3R produced the highest chip yield with both varieties producing over 33.2 per cent recoverable chips. Chipping quality of potatoes grown at Park River was superior to those grown at Grand Forks.

(Chipping Tests - State Trials, 1958)

Thirteen selections and varieties grown in variety trials at Grand Forks and Park River in 1957 were tested for chipping quality during November 1957, and January, February, and March 1958 (North Dakota Table 3). All potatoes tested for chipping were removed from cold storage (approximately 35-40° F) on January 14, 1958, and chipped on January 20, February 4 and 17, and March 15. Chip color and yields were determined at both locations. Kennebec, Cobbler, Norland, ND 2774-3R, Nordak, and Norgleam made acceptable chips. Kennebec and ND 2774-3R produced the lightest colored chips.

(Chipping Tests - Williston Irrigation and Non-irrigation Trials, 1957)

Samples from 8 varieties and selections grown in trial at Williston under irrigation and non-irrigation were tested for chipping quality during 1958 (North Dakota Table 4). At planting time the potatoes grown under irrigation received 195 pounds of 33.5-0-0 fertilizer, while the non-irrigated trial received 166 pounds of 0-45-0.

Potatoes were removed from cold storage and reconditioned for 3 weeks prior to chipping during February and March. Of the varieties and selections grown under irrigation, only Cobbler made acceptable chips. Most all varieties and selections grown in the non-irrigated trial produced chips of excellent quality.

North Dakota table 2. Early harvest chipping trials, 1958. Chipping quality of 9 varieties grown at Grand Forks and Park River and harvested on August 1, 15, and 30.

Variety or Selection	August 1				August 15				August 30			
	Grand Forks		Park River		Grand Forks		Park River		Grand Forks		Park River	
	Color 1/	Yield 2/	Color	Yield	Color	Yield	Color	yield	Color	Yield	Color	Yield
Cobbler	4.5	34.3	4.5	32.6	4.4	34.1	5.8	35.1	3.7	32.7	5.5	34.9
Kennebec	3.3	28.9	5.3	32.0	5.7	32.8	5.7	35.3	5.2	33.5	5.0	33.2
Manoto	4.0	31.7	5.1	34.8	5.0	33.6	5.2	34.2	4.7	33.9	4.7	33.0
Nordak	4.0	32.2	5.5	31.8	4.3	33.8	5.9	33.9	4.0	32.0	4.6	32.8
Norgleam	5.1	31.0	3.9	32.0	4.0	31.9	4.1	30.2	4.5	33.5	5.7	31.7
Norland	5.5	31.0	5.5	30.7	6.0	32.8	6.0	30.8	6.0	30.8	6.0	31.6
ND 3324-2	4.6	31.0	5.4	31.8	6.0	33.0	6.0	34.6	5.9	33.4	6.0	33.9
ND 3631-6R	3.3	28.4	5.2	31.3	3.9	31.4	4.3	32.4	5.1	32.3	4.9	32.8
ND 2774-3R	6.0	32.2	6.0	33.6	6.0	34.8	6.0	34.4	6.0	32.8	6.0	34.0
Average	4.5	31.2	5.2	32.3	5.0	33.1	5.4	33.4	5.0	32.8	5.4	33.1

1/ Color rating 1-6 (1 poor-dark, 6 good-very light brown).

2/ Percent based on 100 lbs. of potatoes.

North Dakota table 3. Chipping quality of 13 varieties and selections grown at Grand Forks and Park River, 1957.

Variety or selection	Color 1/ Nov. 4		Color Jan. 20		Color Feb. 4		Color Feb. 17		Color Mar. 5		Color average		Yield average 2/	
	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.	P.R.	G.F.
Cobbler	4.8	4.5	3.5	4.5	5.3	4.5	6.0	5.9	5.9	5.1	5.1	4.9	34.4	33.7
Kennebec	4.5	5.0	6.0	4.5	6.0	6.0	6.0	4.7	5.9	5.3	5.7	5.1	32.1	30.7
Huron	2.0	2.0	1.0	1.0	1.5	2.5	2.9	1.5	2.5	1.8	2.0	1.8	32.0	32.2
Norland	4.8	5.5	4.5	2.5	5.3	5.3	5.8	4.5	5.7	4.7	5.2	4.5	31.3	29.7
Nordak	5.0	4.5	4.3	3.5	5.0	5.0	5.1	4.7	5.5	4.9	5.0	4.5	32.2	31.4
Norgleam	6.0	5.0	4.0	3.3	5.5	4.5	5.8	4.6	5.9	4.5	5.4	4.4	32.6	31.2
ND 2774-3R	6.0	5.5	4.5	5.0	4.9	4.8	5.3	5.8	5.7	5.8	5.3	5.4	32.5	31.5
ND 3324-2	5.0	3.5	4.0	1.0	4.8	2.0	5.4	3.5	5.5	4.3	5.0	2.9	32.4	30.7
ND 3631-6R	3.5	2.3	4.5	1.5	5.5	4.3	5.7	3.4	6.0	3.5	5.0	3.0	31.2	29.6
ND 3676-20	4.3	3.5	3.0	1.5	4.5	2.0	5.7	2.0	5.7	3.1	4.6	2.4	34.0	33.9
ND 3307-2	3.5	3.0	4.0	3.5	5.8	4.0	5.9	4.2	4.2	4.4	4.7	3.8	32.3	33.0
Long No. 2		2.0		2.5		5.5		5.7			3.9			32.0
Picha 40		5.0		2.0		5.5		5.5			4.5			28.8
Average	4.5	4.0	3.9	2.8	4.9	4.3	5.4	4.3	5.3	4.3	4.7	3.9	32.5	31.4

1/ Color rating 1-6 (1 poor-dark, 6 - good, very light brown).

2/ Percent based on 100 pounds of potatoes.

North Dakota table . Chipping quality of potatoes grown at Williston, North Dakota, under irrigation and non-irrigation, 1957-58.

Variety or Selection	Color3/ Feb. 7		Color Feb. 22		Color Mar. 3		Color Mar. 22		Color Average		Yield4/ Average	
	I1/	NI2/	I	NI	I	NI	I	NI	I	NI	I	NI
Cobbler	4.5	5.8	4.8	6.0	5.0	6.0	5.4	6.0	4.9	6.0	33.1	35.7
Early Gem	2.5	4.0	1.8	3.8	3.3	4.4	4.0	6.0	2.9	4.6	30.5	32.7
Mancota	3.5	4.8	1.0	3.8	1.0	4.3	2.2	5.8	1.9	4.7	30.1	35.8
Norland	3.3	5.5	1.5	6.0	3.3	6.0	3.0	6.0	2.8	5.9	28.4	33.4
Nordak	2.0	3.3	2.0	4.7	2.5	5.9	2.8	5.9	2.3	4.7	31.8	35.0
Norgleam	1.5	4.5	2.5	5.7	2.1	6.0	3.0	5.9	2.3	5.5	31.3	35.2
ND 2774-3R	2.5	5.0	4.8	5.0	2.6	6.0	2.8	5.8	3.2	5.5	30.8	32.8
ND 3324-2	2.0	6.0	4.3	6.0	2.0	6.0	3.0	5.9	2.8	6.0	30.7	34.6
Average	2.7	4.9	2.8	5.1	2.7	5.6	3.3	5.9	2.9	5.3	30.8	34.4

1/ I = Irrigation
2/ NI = Non-irrigation
3/ Color rating 1 - 6 (1 poor-dark, 6 good, very light brown).
4/ Per cent based on 100 pounds of potatoes.

Variety Trials

Six replicated variety trials were grown in North Dakota during 1958. These trials were located at Fargo, Park River, Grand Forks, Minot, and with and without irrigation at Williston. For the second consecutive year the trial at Fargo suffered severe damage from flooding and high temperatures accompanying soil compaction. Although the Fargo trial was harvested and weighed, only the specific gravity data was considered to be valid. Environmental factors for potatoes were excellent at Grand Forks and Park River. Dry conditions existed at Minot and Williston.

Trials were planted as randomized blocks with 4 replications of 25 hills each per variety.

Fertilizer applied, soil type, planting and harvest date of each location follows:

Location	Fertilizer applied	Soil type	Planting date	Harvest date
Fargo	200#/acre 15-5-5	Fargo Clay	May 16	Sept. 27
Grand Forks	200#/acre 16-16-8	Bearden Clay Loam	May 9	Sept. 11
Park River	200#/acre 16-16-8	Glyndon Silt Loam	May 6	Sept. 5
Minot	None	Loam	May 15	Oct. 3
Williston Irrigation, plus	150#/acre 11-48-0 banded 100#/acre side dressed	Havre Clay Loam	May 10	Sept. 13
Williston Dryland	150#/acre 11-48-0	Williston Loam	May 10	Sept. 13

Ten varieties and selections were grown in trial at Williston and Minot. Fifteen varieties and selections were grown at Fargo, while 22 and 25 varieties and selections were grown at Grand Forks and Park River, respectively. Eight varieties and selections were grown at all 5 locations.

Highest yields were recorded at Park River and Williston irrigation, while the lowest yields were recorded at Minot.

Red Pontiac produced the highest average yield of all varieties and selections grown in trial (North Dakota Table 5). Other varieties and selections with good yielding ability were Kennebec and ND 3324-2. With the exception of ND 3631-6R, very small differences in yield existed between the varieties Cobbler, Nordak, Norgleam, and Norland.

Of the varieties and selections grown at Park River and Grand Forks, ND 3152-1, ND 4121-25, ND 4122-2, and F 29-1 produced the highest yield. Other varieties and selections with good yielding ability in these trials were ND 3307-2, Red LaSoda, and ND 3740-11 Russ. At Park River the red selections ND 3815-1R, ND 3959-2R, and ND 3631-5R produced high yields. Lowest yielding varieties and selections grown at Park River and Grand Forks were ND 3569-1 Russ and ND 3676-21 Russ. In total yield Colorado seedling 12240 outyielded Colorado seedling 13178 by 90 bushels per acre. However, the marketable yield for both

North Dakota table 5. Marketable yield in bushels and cwt. per acre of varieties and selections grown in State-wide potato variety trials, 1958.

Variety	Park River		Grand Forks		Minot		Williston Dryland		Williston Irrigation		Average Yield	
	Bu.	Cwt.	Bu.	Cwt.	Bu.	Cwt.	Bu.	Cwt.	Bu.	Cwt.	Bu.	Cwt.
Red Pontiac	590	354	384	231	169	101	214	131	618	377	395	239
Kennebec	563	338	363	218	119	92	204	124	499	305	350	215
ND 3324-2	492	296	311	187	104	63	146	89	482	306	307	188
Cobbler	519	312	299	179	106	64	133	81	384	235	288	174
Norland	507	304	276	166	100	60	157	96	326	199	273	165
Nordak	422	254	322	195	102	61	97	59	394	241	267	162
Norgleam	440	264	324	195	106	64	98	60	337	206	261	158
ND 3631-6R	341	204	277	167	79	47	138	84	351	214	237	143
ND 3699-5R	424	255			86	52	123	75	447	273	270 1/	164
Huron					141	85	155	95	580	354	292 2/	178
ND 3152-1	571	343	361	217							446 3/	280
ND 4121-25	510	306	332	200							421 3/	253
ND 4122-2	507	304	334	201							421 3/	253
F 29-1	509	305	319	192							414 3/	249
ND 3307-2	491	295	320	192							405 3/	244
Red LaSoda	475	285	285	171							380 3/	228
ND 3740-11	477	287	271	163							374 3/	225
Haig	426	256	248	149							337 3/	203
ND 3694-6	386	232	276	166							331 3/	199
ND 3569-1	321	193	218	131							270 3/	162
ND 3676-21	326	196	195	117							261 3/	157
ND 3562-5			189	114								
ND 4066-4			181	108								
ND 4066-6			173	104								
ND 3815-1R	502	302										
ND 3959-2R	496	298										
ND 3631-5R	495	297										
C.S. 12240	376	226										
C.S. 13178	371	222										
Average	462	277	285	171	111	69	147	89	442	271		
L.S.D. 5%	120	72	8	14	47	28	6	6	177	108		
1%	159	96	11	19	64	38	13	8	238	146		

1/ Average 4 locations
2/ Average 3 locations
3/ Average 2 locations

selections was quite similar. C.S 12240 produced many undersized tubers. ND 3562-5, ND 4066-4, and ND 4066-6 produced the lowest yields in the Park River trial.

The most promising advanced selections and varieties in trials were Norland, ND 3324-2, ND 4121-25, ND 4122-2, F 29-1, ND 3740-11 Russ, ND 3815-1R, and C.S 13178. ND 3324-2 and ND 4122-2 both possess good yielding ability and excellent tuber type, with the latter having a high degree of resistance to late blight and scab. ND 4121-25 and F 29-1 are immune to virus X and resistant to late blight and scab, while ND 3815-1R is a large, smooth, shallow-eyed red selection. In percent U.S. No. 1 and overall performance, Colorado seedling C.S 13178 was found to be superior to C.S 12240. Both Colorado seedlings produced tubers that were smooth and shallow-eyed.

Based on all trials Cobbler with an average of 22.6 percent total solids was the highest in trial (North Dakota Table 6). Other varieties and selections producing high total solids were Kennebec, ND 3324-2, Nordak, and Norgleam. When grown at 5 locations, the average percent total solids for Norland and Red Pontiac were 20.0 and 20.4 respectively. The variety Huron grown in trial at Minot and Williston was quite comparable to Cobbler in total solids. ND 4122-2, ND 3694-6, and ND 3676-21 grown in trial at Park River, Fargo, and Grand Forks were high in percent total solids.

The excellent growing and harvesting conditions occurring in North Dakota in 1958 produced very high total solids for most varieties and selections grown in trial. The percent total solids recorded for the variety Red Pontiac was unusually high. Grand Forks with an average of 22.6 produced the highest percent total solid, while Fargo and Williston irrigation with an average of 20.1 and 20.2 respectively, produced the lowest percent total solids.

The earliest maturing selections or varieties in trial were Norland, Nordak, and ND 3676-21. Late maturing varieties were Kennebec and Huron. Varieties and selections showing a high degree of scab resistance were Norland, Huron, F 29-1, ND 4122-2, ND 4121-25, and ND 3740-11 Russ.

For the second consecutive year the selection ND 3631-5R was the highest yielding variety or selection grown in the red trial at Grand Forks. (North Dakota Table 7). In 1958 this variety outyielded Red Pontiac by approximately 50 bushels per acre. Other varieties and selections producing high yield in the red trial were ND 3815-1R and Red Pontiac. No significant difference in yield were found between the varieties Red Pontiac, Redbake, Norland, and Red Warba. Red sport of Triumph was the lowest yielding variety or selection in trial.

In the red trial ND 4090-1R was the highest in percent total solids, while Red sport of Triumph was the lowest. All varieties and selections produced over 20 percent total solids. Varieties and selections with the most scab resistance were Norland and ND 3913-5R. Norland, Picha 40, Red sport of Triumph, and Red Warba were the earliest maturing varieties or selections in trial.

North Dakota table 6. Total solids of potatoes grown in State-wide variety trials, 1958.

Selection or variety	Fargo	Park River	Grand Forks	Minot	Williston		Average
					Dryland	Irrigation	
	Solids	Solids	Solids	Solids	Solids	Solids	Solids
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Cobbler	20.5	22.9	23.7	24.1	22.9	21.3	22.56
Kennebec	20.8	22.3	23.9	24.1	22.9	20.8	22.35
ND 3324-2	20.5	23.1	23.5	21.6	22.4	20.5	21.93
Nordak	20.3	21.6	22.4	24.0	22.1	21.0	21.90
Norgleam	20.5	21.3	22.2	22.4	22.2	21.0	21.60
ND 3631-6R	19.1	20.5	22.3	20.3	22.1	19.3	20.60
Red Pontiac	18.8	20.1	22.3	20.1	21.3	19.5	20.35
Norland	18.2	20.8	21.1	19.6	20.8	19.5	20.00
Huron	20.8			21.8	22.9	21.0	21.63
ND 3699-5R		21.6		19.6	20.5	19.5	20.30
ND 4122-2	20.8	22.9	24.1				23.50
ND 3694-6	20.3	23.3	23.9				22.50
ND 3307-2	20.5	21.8	22.7				21.66
F 29-1	19.9	22.1	22.9				21.63
ND 3740-11	19.0	21.8	22.9				21.23
Red LaSoda	19.6	21.1	21.6				20.76
ND 3676-21		23.1	23.6				23.35
Haig		22.3	22.9				22.60
ND 4121-25		22.1	22.3				22.00
ND 3569-1		21.3	21.6				21.45
ND 3152-1		20.3	22.3				21.30
ND 4066-4			23.7				21.30
C.S. 13178			23.1				
C.S. 12240			22.9				
ND 3562-5			21.3				
ND 4066-6			21.2				
ND 3815-1R		21.0					
ND 3631-5R		21.0					
ND 3959-2R		20.5					
Excel	22.3						
Average	20.1	21.8	22.6	21.8	21.9	20.2	
L.S.D. 5%	.24	.12	.15	1.02	.24	.31	
L.S.D. 1%	.44	.16	.20	1.47	.34	.44	

North Dakota table 7. Red-skinned potato variety trial. Marketable yield in bushels and cwt. per acre, per cent U. S. No. 1, total solids of selections and varieties grown at Grand Forks, North Dakota, 1958.

Selection or variety	Total yield		Marketable yield		U. S. No. 1	Total solids
	Bu.	Cwt.	Bu.	Cwt.	Pct.	Pct.
3631-5R	458	275	456	274	92	22.1
3815-1R	407	245	407	244	92	21.4
Red Pontiac	402	241	400	240	97	21.8
4090-1R	396	238	398	239	89	23.1
3959-2R	396	236	382	229	89	21.1
Redbake	387	233	385	231	92	22.7
Norland	367	220	358	215	96	21.4
Red Warba	357	215	361	217	89	22.4
3913-5R	356	214	355	213	90	22.7
3707-1R	353	212	356	214	91	21.8
3978-6R	346	208	342	205	96	22.4
3640-19R	331	199	331	198	88	22.9
3631-6R	323	194	319	192	87	21.6
Red LaSoda	317	190	320	192	95	22.1
3699-5R	313	188	308	185	91	22.1
Picha 40	296	177	286	172	85	21.6
Triumph	276	166	278	167	93	20.8
Excel	271	163	267	160	89	22.7
Tri Sport	229	138	231	138	83	20.3
Average	346	205	344	207	90	21.9
L.S.D. 5%	69	41	13	8	.6	.17
L.S.D. 1%	92	55	17	10	1.87	.22

OHIO (COLUMBIANA COUNTY)

Floyd Lower

The purpose of this test is to find the best source of seed for local growers and to find the most promising new varieties for trial.

Certified seed or its equivalent was used. The cut seed was treated with dry captan before planting. The test was planted on Wooster silt loam on which an alfalfa-timothy sod was plowed down. Fertilizer (8-16-16) was applied in the row at the rate of 1200 pounds per acre. The mid-season varieties were planted April 25; the late ones May 31. All the varieties were harvested after the middle of October and two or three weeks after having been killed by a frost. The usual cultural practices were followed including spraying for disease control but some late blight did develop late in the season.

Yields, Sources and Comments. The average yield for the 28 early and mid-season varieties was 613 bushels per acre and for the 16 late varieties, 391 bushels per acre. There was an extreme variation in the yields in the different lots in these groups. Yields are computed on the basis of total production of field run potatoes and not on a marketable basis. The yield table, however, indicates something as to the size and grade of those that were not average or standard. Due to the season there were many lots of poor grade and there was much late blight on the tubers. Tawa, Russet Sebago, Russet Rural, and White Rural had many small tubers. Early Gem, Cherokee, Russet Cherokee, and Rukat showed considerable growth cracks. Cherokee and Russet Cherokee showed much second growth. The tubers of Saco were large and misshapen. Among those that were most true to type, smooth and uniform, were Katahdin, White Cloud, Red Pontiac, Delus, and Sebago. The following varieties will be discarded from future tests: White Cloud, Early Gem, Cherokee, Russet Cherokee, Redburt, Russet Sebago, and probably Saco.

Plymouth, Cherokee, Tawa, Delus, Kennebec, Saco, Merrimack, and Boone are listed as resistant to late blight. Sebago and Katahdin are partially resistant. Of these varieties, Delus, Kennebec, Saco, and Boone showed considerable late blight rot on the tubers. The others showed very little. Saco which is listed as very resistant to late blight showed 15 to 20% rot from this disease.

Red Pontiac was among the top in yield this year. Kennebec, Red LaSoda, Redburt were also among the top yielders. These lots ran over 800 bushels per acre. Lower table 1 gives the yields of all varieties in order of yield.

New Varieties. A large number of new varieties are grown each year in small lots to observe the plant and tuber characteristics. Of this group, the following will be planted in yield tests next year: Huron, Norland, and Rushmore. Canso, Dazoc, Mohawk, Norkata, Wisc. 1429, N.D. 3324-2, 1961-1, 1801-10, Redbake, Excel, and Haig will be replanted in the observation trials since they have shown some promise. Ten other selections, Knik, Norgleam, N.D.2274-3R, N.D.3631-6R, Marygold, Wisc.X137-52, Wisc.X143-52, Wisc. Ag.29, Antigo, and 46125 are probably worthy of further observation. Osseo, Waseca, Red Warba, 315-48-3X, Osage, Teton, and Houma will be discarded.

Lower table 1. Potato variety test, Columbiana County, Ohio, 1958.

Variety	Lots Planted	Total Yield per acre	Maturity Rating
	No.	Bu.	
Red Pontiac	3	888	EM
Kennebec	1	850	EM
Red LaSoda	1	849	EM
Redburt	1	840	EM
Katahdin	9	584	EM
Plymouth	1	654	EM
Irish Cobbler	1	654	EM
Early Gem	1	647	EM
Russet Cherokee	1	588	EM
Cherokee	2	526	EM
Rukat	1	512	EM
Redkote	1	495	EM
Manota	1	488	EM
White Cloud	1	446	EM
Tawa	1	442	EM
Red Beauty	1	385	EM
Delus	1	343	EM
Saco	2	569	L
Sebago	4	511	L
Boone	1	390	L
Russet Rural	5	303	L
Russet Sebago	1	368	L
Merrimack	1	313	L
White Rural	2	245	L

OHIO

J. P. Sleesman

The potato improvement project in Ohio is concerned with the development of insect resistant varieties in cooperation with the U. S. Department of Agriculture. Insects of major importance are the potato leafhopper and the potato flea beetle. Leafhopper populations were determined by counting the nymphs on a 10-leaf sample randomly collected from each plot. Comparative flea beetle damage estimates were made by counting the adult flea beetle feeding punctures in a sample of 10 leaves picked at random from each plot.

About 2000 seedlings were grown at Wooster for insect evaluations. Approximately 60 seedlings were planted on muck land at Celeryville for scab resistance studies but the entire planting was lost because of heavy rains in July which flooded the experimental site for several days. The various seedlings were supplied by cooperators as follows:

R. V. Akeley, USDA	1600 seedlings
August E. Kehr, USDA	432 seedlings
G. H. Rieman, Wisconsin	5 seedlings

The data summarized in Ohio Tables 1 and 2 show that there is considerable variation among the varieties in susceptibility to leafhopper and flea beetle attack. Resistance to the potato leafhopper, as in previous years, was not correlated with resistance to the potato flea beetle. In general late maturing varieties are most resistant to attack by the potato leafhopper.

Varieties with the foliage in the best condition due to resistance to insects and late blight were S 3001-1, S 3022-8, S 5608-1, S 5608-2, I 1077-16, I 1419-7, I 1442-4, I 14129-1, I 14156-1, B 4184-21, 4187-1, and B 3957-2.

A planting of Wisconsin seedling X 137.52 survived the flood which destroyed the scab nursery at Celeryville. This seedling, as in 1957, was highly resistant to scab and tuber appearance was good.

Ohio Table 1. Leafhopper and flea beetle resistance in various Iowa potato seedlings, Wooster, Ohio, 1958.

Variety	Parentage	Leafhopper nymphs per leaf August 7	Flea beetle holes per leaflet August 7
I 781-7	Osage x I 45-10-6	6.4	51
I 894-1	1276-185 x B 67-11	5.8	28
I 898-1	1276-185 x 45-1-2M	7.2	50
I 1077-16	Min. 113.43-1 x GOT-1	7.4	39
I 1092-2	Teton x B 962-32	--	--
I 1107-3	B 595-76 x Osage	8.2	31
I 1119-1	B 792-88 x B 962-32	4.6	37
I 1158-1	B 926-9 x ND 457-1	5.4	53
I 1213-1	I 976-3 x I 947-10	6.0	91

Ohio Table 1, continued.

I 1213-2	I 976-3 x I 947-10	6.6	130
I 1327-1	B 2875-8 x I 1077-16	5.6	53
I 1402-4	B 595-76 x I 1077-14	9.4	15
I 1403-1	B 595-76 x I 1077 W 28-5	8.8	61
I 1411-1	I 1077 W 28-5 x I 902-2	6.2	61
I 1412-6	I 1077 W 28-5 x I 902-2	3.2	24
I 1416-1	I 1106-5 x I 1077-14	6.0	43
I 1416-3	I 1106-5 x I 1077-14	4.0	32
I 1419-4	X 927-3 x I 1077 W 28-5	2.6	40
I 1419-5	X 927-3 x I 1077 W 28-5	5.2	23
I 1419-6	X 927-3 x I 1077 W 28-5	4.2	49
I 1419-7	X 927-3 x I 1077 W 28-5	5.4	30
I 1422-1	I 1077 W 28-5 x Osage	9.0	33
I 1436-1	B 922-3 x I 902-3	2.8	22
I 1440-1	I 801-10 x X 927-3	3.0	50
I 1441-3	X 927-3 x I 902-2	7.6	58
I 1442-3	X 927-3 x I 902-3	7.8	40
I 1442-4	X 927-3 x I 902-3	6.4	52
I 1443-4	X 927-3 x I 1106-1	9.9	40
I 14129-1	Ac 25668 x I 902-3	8.4	46
I 14141-5	X 927-3 x Osage	7.8	37
I 14156-1	Mittefruhe x tub. acaule	9.6	22
I 5583-5	I 1107-3 x Katahdin	8.6	21
S3001-1	W demissum x tub. x I 1077-3	9.6	16
S3021-1	I 872-4 x 4N chacoense	9.0	9
S3022-1	X 927-3 x 4N chacoense	9.5	18
S3022-5	X 927-3 x 4N chacoense	10.0	63
S3022-6	X 927-3 x 4N chacoense	11.4	20
S3022-8	X 927-3 x 4N chacoense	3.0	97
S4063-1	IVP 354 x 4N chacoense	1.0	20
AI 5561-1	Chacoense - tub. x Katahdin	2.6	15
AI 5561-4	Chacoense - tub. x Katahdin	.6	23
AI 5561-8	Chacoense - tub. x Katahdin	3.0	54
AI 5561-9	Chacoense - tub. x Katahdin	--	--
AI 5561-15	Chacoense - tub. x Katahdin	2.0	12
AI 56321-1	OB 2905-1 x B 962-32	9.4	52
AI 56328-1	OB 3596-1 x Cherokee	8.0	48
AI 56330-2	OB 3596-1 x B 2834-3	3.4	32
AI 56331-2	OB 3596-1 x ND 457-1	6.0	77
AI 56352-2	Early Gem x OB 3596-1	4.6	40
S5608-1	S 3022-1 x La 1859	7.0	35
S5608-2	S 3022-1 x La 1859	6.6	50
56330-1	OB 3596-1 x B 2834-3	2.0	7
56331-1	OB 3596-1 x ND 457-1	8.2	63
56331-2	OB 3596-1 x ND 457-1	6.4	45
56331-3	OB 3596-1 x ND 457-1	10.0	46
56331-4	OB 3596-1 x ND 457-1	8.4	46
56331-5	OB 3596-1 x ND 457-1	8.4	73
56352-1	Early Gem x OB 3596-1	4.0	23
56352-2	Early Gem x OB 3596-1	6.4	47

Ohio Table 1, continued.

56352-3	Early Gem x OB 3596-1	6.6	22
56352-4	Early Gem x OB 3596-1	14.4	19
B 4270-1	B 355-24 x B 4005-10	8.6	21
B 4270-2	B 355-24 x B 4005-10	8.4	34
B 4270-3	B 355-24 x B 4005-10	7.6	39
B 4270-4	B 355-24 x B 4005-10	8.2	20
B 4270-5	B 355-24 x B 4005-10	9.6	40
B 4270-6	B 355-24 x B 4005-10	10.2	46
I Cobbler	---	9.0	69

Ohio Table 2. Leafhopper and flea beetle resistance in various USDA seedlings Wooster, Ohio, 1958.

Variety	Parentage	Leafhopper nymphs per leaf July 29	Flea beetle holes per leaflet July 29
B 4131-1	OB 3022-1 x OB 3031-1	0.9	5.8
B 4131-10	OB 3022-1 x OB 3031-1	.6	3.2
B 4131-12	OB 3022-1 x OB 3031-1	.6	5.2
B 4181-1	OB 3672-2 x OB 3672-4	1.0	4.7
B 4181-11	OB 3672-2 x OB 3672-4	1.3	4.7
B 4182-1	OB 3672-4 x OB 3672-1	.1	5.2
B 4182-2	OB 3672-4 x OB 3672-1	.1	2.5
B 4182-4	OB 3672-4 x OB 3672-1	.7	9.1
B 4184-2	OB 3672-6 x OB 3672-5	.9	4.7
B 4184-6	OB 3672-6 x OB 3672-5	.6	4.3
B 4184-19	OB 3672-6 x OB 3672-5	2.1	2.6
B 4184-20	OB 3672-6 x OB 3672-5	.1	1.8
B 4184-21	OB 3672-6 x OB 3672-5	1.0	2.5
B 4187-1	OB 3612-1 x OB 3672-6	.4	5.2
B 4187-4	OB 3612-1 x OB 3672-6	.5	8.5
B 4187-5	OB 3612-1 x OB 3672-6	.1	2.5
I Cobbler	---	2.5	4.4

PENNYSLVANIA

Paul Grun and Margaret Krum

Nature of the reproductive isolations among diploid species of Solanum.

Crossings between diploid species of Solanum were continued, as described in previous reports, in order to evaluate the types and completeness of barriers to gene exchange that are present. Approximately 1800 new crosses between species were attempted in order to complete the data for this part of the program.

In the previous report germination of seed of species within section Commersoniana was reported to be higher than that of seed of species within Tuberosa, or inter-sectional Tuberosa x Commersoniana hybrids. This difference in germinability has not been confirmed in a repeat test run several months after the initial one, seed of all combinations showing over 90% germination. There is a partial confirmation of the earlier result, however, in that the within-Commersoniana seed does germinate a few days earlier than does seed of the Tuberosa section, or Tuberosa x Commersoniana combinations.

The polyadenium x macolae (Kurtzianum) putative hybrids have been examined from morphological and cytological viewpoints, and confirmed to be fertile plants of pure polyadenium stock. To date, therefore, 324 attempts have been made to cross polyadenium with other species, and all have failed.

Pollen fertility of 425 inter-and intra-specific combinations has been assayed in terms of proportion of grains that appear normal and can be stained with propiono-carmine. Most of these plants were within section Tuberosa or Commersoniana, or were hybrids resulting from crossing of species of the two sections. Male-sterility of varying degrees was found in plants of the parent species about as frequently as in inter-specific hybrids. Whether plants were sterile appeared to be a function of specific genotypes involved rather than a general species characteristic. The variability of results may partially reflect the well-known fact that environmental modification of sterility in Solanum is extreme. Hybrid sterility, at least at the F_1 level, is apparently not a major problem in combinations of species of these two sections.

A characteristic type of male sterility not found previously occurs in inter-specific combinations involving S. verrucosum (Section Demissa) with species of the sections Tuberosa and Commersoniana. In crossing attempts it has been found that one can easily cross S. verrucosum with members of the section Tuberosa, but only if verrucosum is used as the female parent. This barrier also usually applies to crossings of verrucosum with members of the section Commersoniana, but it is lacking when verrucosum is crossed with some forms of S. chacoense. Pollen formation of S. chacoense x verrucosum, using verrucosum as the male parent, is normal, grains being well-formed and staining normally with propiono-carmine. Those hybrids involving S. verrucosum as the female parent, however, usually, though not always are male sterile.

Pollen fertility even of sibling plants varies as much as from 1 to 94%. When the plants are sterile the four microspore products of each microsporocyte remain in an immature stage of growth, and adhered to one another to form a figure that looks, from above, like a clover-leaf. The clover-leaf tetrads sometimes stain normally with propiono-carmine, and sometimes are apparently empty. The fact that the sterility has been seen only when varrucosum is the female parent suggests that there may be a cytoplasmic basis for the sterility, while the segregation within sibling populations points also to a gene basis. The cause of the sterility probably rests, therefore, on a genic-cytoplasmic interaction.

PENNSYLVANIA

J. D. Harrington and E. C. Pifer

Experimental Conditions
Centre County

Research variety trials were conducted at the Agronomy Research Farm near Centre Hall, Pennsylvania on a Hagerstown silt loam soil. In the summer of 1957, barley was harvested from the experimental site. In the fall of 1957, domestic ryegrass was sown over the area and plowed down prior to planting in the spring of 1958. Since the acquisition of the experimental farm by the Department of Agronomy three years ago a vigorous fertilization program has been initiated in an effort to raise the fertility of the land. Prior to planting 1600 pounds per acre of a 5-10-10 analysis fertilizer was banded while marking the rows.

A randomized block design with five replications was employed for each maturity group. Seedpieces were hand-planted 9 inches apart within the single row plots and measured 30 feet in length with 36 inches between the row.

The experimental plots were shallow cultivated between the rows twice and hand weeded periodically throughout the growing season to control weeds. A regular spraying schedule which included parzate, D.D.T., and a bordeaux mixture, in the latter part of the season, was vigorously employed.

All varieties were planted May 1, 1958 and the early varieties were dug, approximately one week after the first killing frost in the fall, on September 29, 1958. The medium and late maturing varieties were dug October 6, 1958. Stand counts were made 45 days after planting. Total plot yields were recorded in the field, then taken to the potato storage cellar and at a later date graded. Random samples, of approximately one peck, for each replication, were saved for specific gravity determinations. A conversion table prepared by Foth (1907) was used for determining percent dry matter.

At this location, and in general at all sites the climatological conditions were characterized by an abundant of precipitation and cool temperatures throughout the growing season.

Experimental Conditions
Outlying Counties

Research trials at the eight varying ecological sites in the state were conducted in cooperation with leading potato growers in their respective areas. Proper cultural practices of the variety trials were maintained by the cooperator as the research plots were adjacent to the grower of normal potato acreage.

All experiments were designed as a randomized block with 4 replications. Seed pieces of each variety were hand planted in single-row plots, 30 feet in length, and 9 inches apart within the row. The distance between rows varied depending upon the location (see footnotes Pa. table 2.). Final plot yields were recorded at digging and graded immediately according to U. S. Federal Grades. A composite sample of the 4 replications was saved for dry matter determinations.

Results

The results of the variety trials as conducted at the Agronomy Research Farm near Centre Hall, Pennsylvania and outlying State trials are shown in Pa. tabl 1 and Pa. table 2, respectively.

It is interesting to note, Pa. table 1, that B 2368-4, a developed U.S.D.A. strain produced significantly higher yields, as was also the case in 1957, a dry season, than any other identified variety in its maturity group. Additionally, the Huron variety, a Canadian release, performed exceptionally well under the conditions of these experiments. Equally important, Huron showed an extremely high quality potato as judged by its dry-matter content.

Pa. table 1. Yields in hundred weights per acre, percent U.S. No. 1, and percent total solids of different potato maturity groups grown at Universit research farm near Centre Hall, Pennsylvania, 1958.

	Yield per acre		
	Total	U.S. No.1	Total Solids
	Cwt.	Pct.	Pct.
Early Varieties:			
B 605-10	378	94.0	17.8
CU 1335	419	88.5	18.7
Cherokee	364	88.9	18.6
Chippewa	402	87.8	17.5
Cobbler	332	87.6	20.0
Dazoc	270	86.6	17.1
Early Gem	311	92.8	17.5
Huron	496	83.8	21.5
Norland	318	89.6	16.2
Onaway	305	94.6	17.1
Plymouth	367	96.2	18.5
Red Bliss	337	88.8	17.2
Tawa	232	87.9	17.1
L.S.D. .05	45		0.6
Medium Varieties:			
B 2368-4	555	91.1	18.8
Delus	370	97.2	22.0
Katahdin	355	92.1	18.5
Kennebec	427	90.9	19.6
Pungo	477	95.7	19.9
Saco	494	92.4	20.3
L.S.D. .05	34		0.6
Late Varieties:			
Boone	352	91.8	18.1
Merrimack	298	89.2	21.4
Ontario	336	82.2	18.2
Red Pontiac	478	87.6	17.1
Rukat	362	88.0	17.5
Russet Rural	353	82.0	20.1
Russet Sebago	399	87.8	19.8
Sebago	380	88.1	18.9
Smooth Rural	430	87.5	20.2
L.S.D. .05	45		0.8

Pa. table 2. U. S. No. 1 yields in hundred weights per acre and percent solids of different maturing potato varieties reported in 7 counties and at 8 locations in 1958. 1/

Variety	Erie * Yield	Erie * Solids	Lehigh * Yield	Lehigh * Solids	Luzerne * Yield	Luzerne * Solids	Potter ** Yield	Potter ** Solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Cherokee	192	17.9	132	20.2	207	17.8	295	17.7
Chippewa	261	17.0	153	18.5	168	16.3	401	17.1
Cobbler	309	17.0	119	19.2	134	18.1	355	19.2
Tawa	100	16.4	130	18.7	148	17.4	197	17.3
Onaway	173	15.5	165	17.6	169	17.4	123	17.6
CU 1335	234	17.1	-	-	-	-	283	18.6
Delus	278	18.5	169	22.2	203	20.5	260	20.5
Huron	264	19.3	-	-	-	-	472	19.1
Katahdin	362	17.8	182	20.2	304	17.3	207	18.9
Kennebec	258	17.4	214	19.7	227	17.7	315	18.1
Plymouth	264	18.4	149	20.3	230	19.0	267	17.4
Merrimack	185	19.4	160	23.5	232	20.9	193	18.5
Pungo	244	18.8	182	21.4	280	19.4	377	20.4
Russet Rural	233	18.0	111	20.9	154	19.5	366	19.5
Russet Sebago	301	17.7	121	19.8	292	17.2	289	17.9
Sebago	386	16.6	127	19.0	301	17.2	267	18.0
L.S.D. .05	82		31		46		62	
L.S.D. .01	109		41		62		83	

1/ Research trials conducted by Extension Agronomist, E. C. Pifer, in cooperation with Extension representatives of the Departments of Agricultural Economics, Entomology, Plant Pathology, and with the Agronomy Staff, of the Agricultural Experiment Station.
* 34 inches between rows.
** 32 inches between rows.

Pa. table 2, continued.

Variety	Schuylkill Hegins, Pa.** Yld.	Schuylkill Hegins, Pa.** Sol.	Schuylkill Ringtown, Pa* Yld.	Schuylkill Ringtown, Pa* Sol.	Somerset* Yld.	Somerset* Sol.	York* Yld.	York* Sol.	Average Yld.	Average Sol.
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Cherokee	221	17.5	310	15.0	262	18.0	246	16.9	233	17.6
Chippewa	245	15.6	272	16.1	377	17.0	326	15.4	275	16.6
Cobbler	149	18.6	278	17.6	180	18.3	227	17.5	219	18.2
Tawa	119	17.5	191	16.0	173	16.0	171	16.8	154	17.0
Onaway	213	16.2	316	15.1	147	17.5	304	15.3	201	16.5
CU 1335	-	-	-	-	-	-	-	-	258	17.8
Delus	210	20.8	320	19.0	247	20.8	221	19.8	239	20.3
Huron	-	-	-	-	-	-	-	-	268	19.2
Katahdin	281	17.1	285	15.1	245	18.3	254	17.2	265	17.7
Kennebec	197	17.1	355	18.2	321	18.4	312	17.4	275	18.0
Plymouth	243	18.3	317	16.4	305	19.0	281	17.3	257	18.3

continued

Pa. table 2, continued.

Merrimack	226	20.2	237	16.7	205	20.1	257	18.5	212	19.7
Pungo	282	19.4	420	18.4	316	19.6	276	17.4	297	19.3
R. Rural	299	19.6	287	18.7	250	20.8	253	18.0	244	19.4
R. Sebago	216	17.1	342	14.8	269	18.5	286	15.3	265	17.3
Sebago	246	16.3	357	14.8	351	19.4	330	15.8	296	17.2
L.S.D. .05	26		59		60		45			
L.S.D. .01	34		79		81		60			

* 34 inches between rows.
** 32 inches between rows.

PENNSYLVANIA
W. R. Mills

The six months of April through September were spent with the Interamerican Institute of Agricultural Sciences in Costa Rica, where I was affiliated with the potato program cooperative between the Institute and the Costa Rican Ministry of Agriculture. Problems of particular interest to me concerned late blight resistance, selecting of improved varieties, and production of inspected seed.

Potatoes are grown in Costa Rica at altitudes varying from 5500 to about 10,000 feet, where the cool, moist climate is ideal for late blight. All varieties are sprayed seven or eight times per year with knapsack sprayers, with the result that three-fifths of all labor required to produce the crop is spent on spraying. The importance of blight resistance in Costa Rica is obvious. About 3000 seedlings, produced at Penn State and unselected except for screening with certain races of <u>Phytophthora infestans</u> were planted there. About 60 seedlings were selected on the basis of apparent blight resistance and adaptation, for further testing by local personnel.

Potato production in Costa Rica is mainly from local varieties of unknown origin, grown for many years with no attention paid to seed-borne diseases, varietal mixture, etc. The Cooperative Potato Program is attempting to discover better varieties, by routine testing of named varieties and unnamed seedlings originating at Cornell and Penn State, and to provide good seed of these to growers. The program has been successful in the former, but has failed to provide significant quantities of seed. By long-standing custom, only whole tubers are used for seed, and the improved varieties produce few small tubers. In limited experience, cut seed has given very poor stands. In order to increase new varieties more rapidly and to develop a seed industry which is something more than a by-product of the table-stock industry, methods are required to make use of a larger proportion of the crop as seed. Plans were detailed for use of fungicides with cut seed, use of suberized seed, etc., as well as early killing of plants to keep the tubers small.

A widely grown local variety called "Morada Blanca" was of special interest to me because of its freedom from leafroll. I examined several fields of this variety and although other viruses were present, I saw no certain leafroll. The virus was present in other varieties. A sample of "Morada Blanca" was sent to Plant Quarantine.

In my absence, the breeding program at Penn State was maintained by a graduate assistant. The season was unusually wet and cold. Blight appeared in the breeding plot around the middle of August, with the simultaneous infection of R_1, R_2, R_1R_4 and R_2R_4 genotypes. No infection was noted on the predominant genotype, R_1,R_2, until September 20. During the next 10 days, infection became general in an acre planting of R_1R_2 selections. At harvest a number of blighted tubers were salvaged, and later isolations from them yielded only race 1,2,4. This is the first time that a 1,2 race has been isolated at State College. No blight was observed on any variety carrying gene R_3.

Chipping tests are made on all selections by the Wise Potato Chip Company. One variety, 4SL-2, continues to be outstanding, both when freshly harvested and after cold storage, in tests over a three year period. A weakness in this variety is a tendency to crack when bruised.

RHODE ISLAND

J. E. Sheehan

Potato yield trials consisting of 20 varieties were conducted at the Rhode Island Agricultural Experiment Station at Kingston in 1958. Seedstock of all varieties used in the test was obtained from USDA sources at Presque Isle, Maine. The potatoes followed one year of corn on Bridgehampton silt loam. Prior to corn the land had been cropped to a grass legume mix for several years.

Yields were calculated on the basis of 32-foot rows. Seedpieces were spaced 12 inches apart in the row with 36-inch spacing between rows. Each variety had four replicates. Fertilizer consisted of 2,000 pounds per acre of an 8-12-12-2 grade applied in bands at planting.

All varieties were planted on April 21 and harvested September 22. A chemical vine killer was applied on September 8. Sebago and Ontario were still active to a limited degree on September 8 when the vine killer was applied.

The 1958 growing season was one of the wettest experienced in many years. Rainfall from April through September amounted to 9.17 inches above normal. Precipitation exceeded the normal by 3.10 inches in April, 0.58 inches in May, 1.03 inches in July, 2.88 inches in August and 1.81 inches in September. The average mean temperature for the same period was 1.8 degrees below normal.

Rhode Island table 1 gives yield and other data from the 20 varieties. B 2368-4 was the highest yielding variety with 424 hundred weight per acre followed by Saco 403 and Kennebec 401 hundred weight per acre respectively. B 2368-4 continues to be one of the most promising of the newer selections tested. Delus, Merrimack and Plymouth although all fairly high in dry matter have been disappointing in respect to yield.

Green Mountain had the highest dry matter content 22.2 percent followed by Merrimack 20.5 percent and Saco and Delus 20.1 percent respectively. Boone had the lowest dry matter content, 17.8 percent. This was the second year for Boone in the trials and it did poorly compared to last year when it ranked second in yield and was considerably higher in dry matter.

Insect and disease infestations were fairly moderate throughout the year. Flea beetle populations were not excessive and readily controlled with one-half pound of Dieldrin in 100 gallons of water per acre. Five insecticide applications were made in total, two in June, one in July and two in August. Aphid and leaf hopper activity was moderately light.

Late blight infestations in August and September necessitated frequent fungicide sprays. A total of seven fungicide sprays were applied, three each in July and August and one in September.

Rhode Island table 1. Yield and other data for 20 potato varieties grown at Kingston, Rhode Island, 1958.

Variety	Yield /Acre U.S. No. 1 Cwt.	Yield /Acre U.S. No. 1 Pct.	Total solids Pct.	Days to maturity No.	Size	Skin and Shape	
B 2368-4	424	98	19.9	136	Large	Rouge	Sl. irreg.
Saco	403	98	20.1	137	Med.	Smooth	Irregular
Kennebec	401	96	19.7	140	Large	Smooth	Regular
Ontario	385	98	19.3	140+	M.Lar.	Smooth	Regular
Green Mountain	381	96	22.2	140	Med.	Rough	Irregular
Pontiac	379	98	18.0	136	Med.	Rough	Regular
Menominee	377	99	18.0	140	Large	Rough	Regular
Chippewa	376	96	18.0	140	Med.	Smooth	Regular
Russet Rural	363	97	19.7	140	Med.	Rough	Regular
Sebago	355	97	18.0	140+	M.Lar.	Smooth	Regular
Russet Burbank	352	94	20.0	140	Med.	Rough	Sl. irreg.
Boone	347	97	17.8	140	M.Lar.	Smooth	Regular
Mohawk	315	99	19.9	138	Large	Rough	Regular
Plymouth	313	97	18.6	138	Large	Rough	Regular
Cherokee	296	96	18.8	126	Small	Smooth	Regular
Irish Cobbler	270	94	19.9	106	Med.	Smooth	Regular
Katahdin	256	96	18.8	126	Med.	Smooth	Regular
Warba	254	96	18.2	112	Small	Smooth	Irregular
Merrimack	252	95	20.5	140	M.Small	Rough	Regular
Delus	218	98	20.1	136	M.Lar.	Rough	Regular
L.S.D. .05	62		1.1				

SOUTH CAROLINA

W. R. Sitterly and W. C. Barnes

Potato Variety Trial

Purpose: To determine the performance of selected varieties under coastal South Carolina environmental conditions.

Field: A-2 was fertilized with 6-8-6 on February 4 and planted on February 5.

Plot Plan: Randomized block, 5 replicates. Individual plots were 1/400 A.

Conditions: The growing season was extremely wet. Seedpieces germinated late and plants developed rather slowly. The trials were harvested approximately 2 weeks later than normal. No disease or insect damage occurred.

Results: Of 20 varieties tested, B 2894-24, B 3428-20, B 3428-41, 50B9-8, B 73-3, Tawa, and Sebago had an external appearance satisfactory for commercial usage. B 3428-20 and B 73-3 had significantly higher dry matter content than Sebago; while 50B9-8 had a significantly higher yield than Sebago, as shown in South Carolina table 1. Under simulated shipping conditions, B 3428-20, B 3428-41, and Sebago had only a slight external browning of the tubers.

South Carolina table 1. Characteristics of potato varieties tested at Charleston, South Carolina, 1958.

Variety	Dry matter	Yield per acre	Shape	Color: Skin	Color: Flesh	Maturity	Appearance
	Pct.	Cwt.					
B 2368-13	17.6	204	Oval	R.rus.	Wh.	L	Fair
B 2894-24	16.6	196	L-oval	Wh.	"	L	Good
B 3428-20	18.0	144	Oval	"	"	M	"
B 2922-26	17.8	148	"	"	"	M	Poor
B 2874-4	17.6	184	"	R.	"	E	"
Tawa (Mo.)	18.5	168	"	Wh.	"	M	Fair
B 3319-30	17.2	144	"	"	"	M	"
B 3428-41	16.6	144	R-oval	"	"	M	Good
B 2368-4	18.3	212	Round	R.	"	L	Fair
X 1276-185	16.6	192	R-oval	Wh.	"	ME	Good
50B9-8	16.8	227	Oval	"	"	M	"
B 3453-2	19.0	116	"	R.rus.	"	L	Poor
B 73-3 (9")	19.3	148	L-oval	Wh.	"	ME	Fair-Good
B 73-3 (12")	18.4	160	"	"	"	ME	"
Tawa (Wisc.)(9")	17.0	164	Oval	"	"	M	Good
Tawa (Wisc.)(12")	16.8	136	"	"	"	M	"
Onaway	16.0	160	"	"	"	ME	Fair
Bliss	16.8	80	R-oval	R.	"	E	"
Cobbler	17.9	208	Oval	Wh.	"	E	"
Sebago (9")	15.6	180	L-oval	"	"	L	Good
Sebago (12")	16.7	152	"	"	"	L	"
Tawa (Mich.)	17.3	128	Oval	"	"	M	Fair
Red LaSoda	16.3	260	L-oval	R.	"	E	"
LSD .05	1.98	46.9					
LSD .01	2.63	62.1					

Reasons for discarding some of these best-appearing varieties: X 1276-185, B 2894-24, and 50B9-8 produced severe external browning during simulated shipping tests. B 3428-41 yielded less than Sebago and had no outstanding characteristic. Tawa, moderate external browning during shipping, slight stem-end browning, and no other outstanding characteristic.

The most promising varieties as compared to Sebago were:

(a) B 3428-20. High dry matter content, browns very slightly during shipping, smooth medium size tuber, vigorous plant type but tending to open.

(b) B 73-3. High dry matter content, slightly rough, browns only slightly during shipping, medium size. Plant type vigorous, bushy and compact.

B 2368-13, B 2922-26, Tawa, B 2368-4, B 3453-2, Cobbler, and Sebago contained various amounts of internal tuber browning, with Sebago containing the most.

In the overall test, B 73-3 had the highest dry matter content, and Red LaSoda produced the greatest yield.

None of the varieties in the spaced planting trials produced a significantly greater yield when planted at either a 9" or 12" distance. Tawa and Sebago produced more at the 9" distance, and B 73-3 produced more at the 12" distance.

Conclusion: B 3428-20 and B 73-3 were the best potato varieties in the trial when compared to the commercially planted Sebago standard.

Chip Tests

Notes: Potatoes were harvested and placed under a packing shed for 5 days, then placed in 70°F. storage until shipped. During the season the crop received 1 ton of 5-10-10 per acre, followed by 25 pounds nitrogen as a sidedressing due to excessive rains. The crop had adequate moisture throughout the growing season. At the chip testing plant, the tubers were stored at 74°F. and 56 percent relative humidity. Chip color and sprout growth measurements were made weekly for 8 weeks. The percentage of storage loss was calculated at the end of the storage period.

Results:

Variety and Seedling	Average Chip Color 1/	Percent Dry Matter	Percent Storage Loss
B 73-3	4.2	19.4	44.3
B 3428-41	4.8	17.2	46.0
Tawa	5.1	18.1	32.3
B 3428-20	5.7	18.3	10.9
B 2894-24	6.1	15.5	64.6
Sebago	7.0	17.9	37.4
X 1276-185	7.6	16.0	33.1
50B9-8	10.1	17.5	39.4

1/ Below 5.0 is required for an acceptable chip color.

B 73-3 is superior to Sebago (standard for South Carolina) in tuber percentage of tuber dry matter and ability to process into a chip of acceptable color. Keeping quality in storage was not quite as high. Tawa produced tubers with higher percentage of dry matter and substantially lighter chip color than Sebago. Other undesirable traits offset the low percentage of storage loss exhibited by B 3428-20.

SOUTH DAKOTA

C. M. Nagel

Twenty-one U.S.D.A. selections were planted at Brookings in the potato scab nursery primarily for their reaction to scab. In addition, 45 other selections and varieties were grown for similar purposes. While scab resistance was of primary concern, reaction to other diseases was noted, including certain growth characteristics (S.D. table 1).

In 1958, one of the few seasons in the last ten, scab development was so light that accurate scab performance records were not possible.

Seed supplies were inadequate for yield trials this year.

South Dakota table 1. Growth responses of U.S.D.A. selections grown at Brookings, South Dakota, 1958. Planted June 6, Harvested September 25, 1958.

edigree No.	Foliage Abundance	Foliage Appearance	Maturity	Early Blight*	Insect Damage*	Wind Damage*	Virus	Yield Estimate
0B9-8	Heavy	Excellent	Late	2	0	0		
605-10	Medium-	Sparse	Early	2	l.h.?	4		Good
2368-4	Abundant	Excellent	Late	1	0	2		
2368-13	Medium++	Dark Green Medium++	Late	1	0	2		Good
3139-24	Medium	"	Medium+	3	0	2	l.r.3	
3309-8	"	"	"	5	0	3		
3352-8	" +	" +	Late	T	0			
3401-4	" +	"	Medium	T	0	1		Good
3837-4	Sparse+	Fair-	"	3	3 f.b.	1		
3857-19	Medium+	" +	" +	1	0			
3696-13	" ++	"	" +	1	0	3		
3726-6	"	" -	"		1 f.b.	4		
3900-3	" ++	Excellent-	Late	T	0			
3903-1	"	Medium+	Medium	4	?	4		Good
3947-2	" -	"	"	1	0	2	l.r.6	
4084-1	Sparse	Fair	Early	6	0	2		
4085-1	Medium ++	Medium+	Medium+	1	0	1		
4085-4	Abundant +	Upright	Late	T	0			Good
4090-3	Medium+	Good	"	1	0	T		Good
4134-14	"	Medium	Medium	2	0		l.r.100 p.l.100	
4158-1	Thin Vines Weak, Sparse	Sparse-	"	1	0	2		

Scoring according to Barrett system.

TENNESSEE
(Crossville)
T. R. Gilmore

On account of heavy rains planting date of the yield plot was delayed from the regular date of about April 10 till May 16. This meant that the growing period was shortened about 4 weeks. An added disadvantage was that after the middle of May generally higher temperatures prevail. The fortunate part of this year's climate was that after a warm and dry June, it started to rain during the last part of the month and the temperature dropped. Climatic conditions for the remainder of the growing season were quite ideal for potatoes. In spite of late planting, a satisfactory yield was still obtained. The plot was harvested August 18.

Seedling TL 6279 produced the highest yield (Tennessee table 1). This is a selfed seedling of TL 1859, and has practically all the good qualities of its parent including resistance to late blight and scab and good cooking quality. In addition it has a bright-red-skin color, whereas TL 1859 is a pink. Seedling TL 3633, a white-skinned potato, also looked very promising.

Tennessee table 1. 1958 potato yield test, Crossville, Tennessee, 3 replications of 25 hills.

Variety or Seedling	Parentage	Yield per acre U.S.No.1	Yield per acre U.S.No.2
		Bu.	Bu.
TL 6279	TL 1859 selfed	429	66
Kennebec		332	69
TL 1859	Pontiac x 96-56	324	51
TL 3633	I 961 B 55T	310	60
TL 3769	Kennebec x B 522-33	293	109
TL 6509	Teton x B 3139-24	276	66
TL 6515	Teton x B 3139-24	264	76
TL 3674	B 446-54 x Teton	254	45
Boone		254	39
TL 6492	Teton x B 3139-24	249	43
TL 4064	B 607-37 x B 607-56	242	98
TL 3764	B 381-2 x B 434-57	223	96
TL 2988	B 96-56 x Sebago	215	30
TL 6043	B 355-24 x B 3160-12	146	46
TL 6003	B 874-35 x B 2997-9	129	30
LSD .05		29	
LSD .01		39	

TEXAS (PRAIRIE VIEW)

J. M. Coruthers, Bruce A. Perry R. V. Akeley, and T. P. Dykstra

Twenty-four varieties were planted in February, 1958 at Substation 18 to test for yield and market qualities. Planting weather was favorable, but moisture became very deficient before the growing season was over. Yields of varieties varied greatly. Highest yields of marketable potatoes were made by Cherokee, Katahdin, Early Gem, Marygold, Tawa, Kennebec, and Plymouth. Facts concerning the experiment are as follows:

Location:	Prairie View, Texas	Planting Date:	February 18, '58
Soil:	Hockley Fine Sandy Loam	Harvest Date:	June 1, 1958
Plot Size:	30 feet x 38 inches.	Insecticide:	10% D.D.T.
Seed Source:	Supplied by R. V. Akeley, Horticultural Crops Research Branch, U.S.D.A., and T. P. Dykstra, Louisiana State University, Baton Rouge, Louisiana	Fertilizer:	600 pounds 5-10-10 per acre applied in bed

Coruthers table 1. Potato variety test, Prairie View, Texas, 1958.

Variety	Yield of potatoes per acre U. S. No. 1	U. S. No. 2	Market-able	Culls	Total
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Green Mountain	11.8	23.4	35.2	16.7	51.9
White Rose	30.7	22.1	52.8	21.2	74.0
Irish Cobbler	7.9	16.5	24.4	26.7	51.1
Marygold	32.5	42.1	74.6	43.7	118.3
Saco	19.5	41.7	61.2	46.5	107.7
Delus	38.1	27.2	65.2	25.1	90.3
Triumph	8.6	38.8	47.4	58.9	106.4
Pungo	18.9	30.7	49.6	32.1	81.7
Katahdin	40.6	45.0	85.6	28.7	114.3
Mohawk	19.4	45.0	64.4	49.3	113.7
Early Gem	28.7	48.9	77.6	41.3	118.9
Chippewa	30.5	12.9	43.4	69.7	113.1
Red Pontiac	23.3	36.5	59.7	40.1	99.8
Kennebec	34.5	34.1	68.6	58.1	126.8
Teton	35.2	23.3	58.4	61.9	120.3
Boone	18.6	35.6	54.2	54.5	108.7
Plymouth	17.8	50.4	68.2	72.0	140.2
Merrimack	17.4	34.6	52.1	29.4	81.5
Cherokee	44.7	52.0	96.7	48.7	145.4
B-605-10	33.8	25.6	59.4	34.6	94.0
Red LaSoda	27.2	39.8	66.9	31.3	98.2
Tawa	36.8	35.9	72.7	40.1	112.8
50B 9-8	29.2	31.9	61.1	52.7	113.8
Onaway	22.9	25.4	48.4	17.5	65.9

TEXAS
(Weslaco)

P. W. Leeper, Bruce A. Perry, H. O. Werner, and R. V. Akeley

The acreage planted to potatoes in Texas has been on the decline since the war years. Average yearly acreage planted in the Lower Rio Grande Valley alone from 1942 through 1951 was 10,890. By 1953, this acreage had declined to 1,700 acres. During 1957 the acreage had reached a low of less than 500 acres. Plantings were increased somewhat during 1958 due to the influence of the Potato Chip Industry in obtaining potatoes from this area.

Several factors have brought about this decline in acreage but probably the combination of low yields from poorly adapted varieties coupled with low prices have been the most important.

Yield testing of commercial varieties and breeding lines have been a function of Substation No. 15 for many years. Through 1957 the outstanding varieties in these tests have been Red Pontiac, Red LaSoda and Sebago. Although these varieties have proven best, they were not productive enough to insure profitable yields or place the Lower Rio Grande Valley on a sound competitive level with Florida. Most of the varieties being grown in this area at present lack much to be desired from a quality standpoint.

During the 1957-58 growing season renewed emphasis was placed on development of a potato variety for the Valley area. One hundred and twenty-five varieties and breeding lines were evaluated for quality and yield in the trials. Three different tests were planted. Single row plots 20 feet long and 38 inches wide were used. Each variety was replicated three times. A preplanting fertilizer application of 40-80-0 was applied before planting. After seedling emergence, an additional 40 pounds of nitrogen was sidedressed. Results recorded from the three tests are shown in Leeper tables 1 through 4.

Results of tests, which included commercial varieties and advanced breeding lines, were similar to those of years past. As shown in Leeper tables 1 and 3, the varieties Red LaSoda and Red Pontiac produced the largest yields.

During the 1954-55 season a program of evaluating seedling potato crosses in early generations was initiated in cooperation with Dr. H. O. Werner, potato breeder and Head of the Department of Horticulture, University of Nebraska, Lincoln, Nebraska. Material showing promise during the first season, as well as many new seedling crosses, were included in the trials of 1958. A number of these crosses were especially promising. Results of this test are shown in Leeper table 4.

Leeper table 1. Yield of potatoes per acre by market grades and sizes, Spring 1958.

Variety	Yield of U.S. No. 1 Grade-50 lb.bags per acre: Size 1 7/8" and over	Size 1½" to 1 7/8"	Total marketable	Culls	Total	Skin Color	Total Solids
	No.	No.	No.	No.	No.		Pct.
Katahdin	211.6	26.5	238.1	7.9	246.0	W	18.7
Merrimack	207.4	31.6	239.0	8.3	247.3	W	20.5
Teton	189.2	35.8	225.0	13.1	238.1	W	19.1
B 605-10	234.6	20.0	254.6	5.8	260.4	W	19.2
Onaway	219.5	15.8	235.3	6.9	242.2	W	17.5
Delus	174.1	13.8	187.9	4.1	192.0	W	20.9
Pungo	213.6	18.6	232.2	4.8	237.0	W	20.2
B 2368-4	264.9	14.8	279.7	7.9	287.6	R	19.5
50B9-8	227.4	21.7	249.1	6.2	255.3	W	18.0
Saco	209.5	36.8	246.3	11.0	257.3	W	20.4
Plymouth	202.6	22.4	225.0	3.8	228.8	W	18.9
Boone	241.8	22.7	264.5	7.2	271.7	W	18.2
B 73-3	179.2	33.0	212.2	5.5	217.7	W	19.4
Tawa	171.0	21.7	192.7	8.6	201.3	W	18.2
Sebago	205.4	27.5	232.9	7.6	240.5	W	18.9
F 29-1	266.3	15.5	281.8	5.2	287.0	W	17.7
La 92-10	147.9	23.7	171.6	6.2	177.8	W	16.8
ND 3324	199.5	37.2	236.7	8.6	245.3	W	20.2
N.D. 3631	119.7	51.3	171.0	21.3	192.3	R	18.6
N.D. 3707	268.0	22.0	290.0	10.3	300.3	R	19.5
Wisc. 125.52	73.6	33.0	106.6	13.8	120.4	W	18.7
Norgleam	92.9	18.9	111.8	12.4	124.2	W	18.7
Norland	196.8	29.2	226.0	11.4	237.4	R	17.8
Waseca	122.1	13.4	135.5	6.9	142.4	R	17.4
Red Pontiac	275.5	18.2	293.7	6.2	299.9	R	17.2
Red La Soda	305.1	18.2	323.3	8.3	331.6	R	18.4
T.L. 6279	254.2	51.3	305.5	11.7	317.2	R	18.2
B 75-4	48.5	4.5	53.0	3.1	56.1	W	21.1
L.S.D. .05	35.9	11.1	39.8	5.0	40.0		
L.S.D. .01	47.6	14.9	52.7	6.5	53.0		

Leeper, table 2. Observational notes on potato yield trial, Spring 1958.

Variety	Wind burn[1/] and heat roll	Maturity[2/]	Plant vigor	Disposition[3/]	Scab[4/]	Remarks
Katahdin	5	4	3	R	1	good type
Merrimack	2	5	2	R	0	good type
Teton	3	4	3	R	1	similar to Katahdin
B 605-10	4	4	4	R	1	slight scurf
Onaway	2	2	5	D	0	rough
Delus	5	4	3	D	1+	stem rot 5%
Pungo	4	2	4	D	1+	medium rough
B 2368-4	1	4	1	R	1+	medium red
50B9-8	4	4	4	R	3	deep scab pits
Saco	3	4	3	D	1+	shallow eyes
Plymouth	2	2	3	D	1	medium long, slightly rough
Boone	2	4	1	R	0	smooth
B 73-3	4	3	3	D	1+	medium rough
Tawa	4	2	4	D	0	smooth
Sebago	2	4	1	R	1+	long, smooth
F 29-1	5	3	4	R	1	oblong, tubers
LA 92-10	4	4	3	D	1+	slightly rough
N.D. 3324	2	2	3	D	1	smooth
N.D. 3631	3	3	4	D	1+	dark red, 10% scurf
N.D. 3707	2	4	3	R	1	dark red
Wisc. 125.52	4	4	5	D	1+	oblong tubers
Norgleam	3	2	5	D	1+	smooth tubers
Norland	4	2	4	D	1+	dark red, 50% scurf
Waseca	4	2	4	D	1+	dirty red, 50% scurf
Red Pontiac	1	4	1	R	1+	scurf 40%
Red LaSoda	2	3	2	R	1	scurf 30%
TL 6279	1	5	2	R	0	bright red, smooth tubers
B 75-4	2	2	5	D	0	very few tubers

1/ 1 = little damage; 5 = severe damage
2/ 1 = green; 5 = mature
3/ R = repeat; D = discard
4/ 0 = 0% scab; 1 = 1-20% scab; 2 = 21-40% scab
3 = 41-60% scab; 4 = 61-80% scab; 5 = 81-100% scab

Leeper table 3. Potato yield and tuber notes on Nebraska seedstocks, spring of 1958, Weslaco, Texas.

Variety	Yield U.S. No. 1 Grade-50# Bags per acre A Size	B Size	Total Marketable	Culls	Total yield	Tuber color 1/	General rating 2/	Total solids
	No.	No.	No.	No.	No.			Pct.
Red LaSoda	273.1	7.9	281.0	3.4	284.4	BR4-S	8.8	18.0
Red Pontiac	267.3	8.3	275.6	3.1	278.7	BR3-4	8.8	17.2
Excel	126.9	57.4	184.3	14.4	198.7	BR5	8.3	20.6
Redbake	210.9	40.9	251.8	13.1	264.9	R5-6	9.0	20.6
Dazoc	216.0	24.4	240.4	9.3	249.7	BPR6	7.3	17.5
Redglo	217.1	31.0	248.1	14.8	262.9	BR8	7.3	17.2
124.48-1X	231.2	54.7	285.9	20.6	306.5	PR8	9.0	17.5
156.48-2X	246.0	37.2	283.2	13.1	296.3	BR6	9.0	20.2
315.48-3X	212.9	28.6	241.5	5.5	247.0	R4	8.5	19.1
90.49-1X	246.0	13.8	259.8	3.4	263.2	R8	8.3	18.9
176.50-3	208.5	16.5	225.0	3.8	228.8	R5	6.8	17.4
38.49-1	177.2	20.1	197.3	3.8	201.1	R7	9.0	19.2
38.49-6	192.3	26.5	218.8	3.8	222.6	BR8	9.0	19.7
143.50-2	164.8	37.2	202.0	20.3	222.3	R6	5.8	19.1
222.50-4	211.9	33.4	245.3	11.4	256.7	PR7	8.8	19.2
284.50-2	117.0	38.2	155.3	13.4	168.6	R8-9	8.0	21.4
181.51-2	196.8	49.2	246.0	13.4	259.4	BR8+	6.3	21.0
120.40-6	189.2	22.0	211.2	3.8	215.0	W	8.8	18.4
29.47-2	168.2	21.7	189.9	8.3	198.2	W	8.0	18.2
Haig	139.0	32.0	171.0	9.3	180.3	W	8.8	18.4
L.S.D. .05	49.1	12.7	47.9	6.1	47.5			
L.S.D. .01	65.2	16.9	63.8	8.1	63.0			

1/ 1 = light red; 9 = dark red
2/ 1 = poor rating; 9 = best rating

Leeper, table 4. Potato yield and tuber notes on Nebraska seedstocks, spring of 1958, Weslaco, Texas.

Variety	U. S. No. 1 Yield Over 3"	Grade 1 7/8" to 3"	B size 1 1/2"- 1 7/8"	Culls	1/ total yield for 3 plots	total solids	2/ tuber color	3 general rating
	lbs.	lbs.	lbs.	lbs.	lbs.	pct.		
93.48-1		7.2	6.5	0.5	14.2	22.2	BR3	6
95.48-1		16.0	2.3	0.5	18.8	19.5	R7	8
114.49-1X		3.9	4.9	1.0	9.8		R3+Br	4
17.50-2		10.9	5.6	0.8	17.3	19.7	R7+Br	7
131.50-2		6.3	4.6	1.0	11.9		BR6	5
191.50-1		6.4	7.6	0.8	14.8		BR6	4
212.50-2		6.3	6.3	0.7	13.3	19.7	BR6	7
45.51-4		5.7	4.7	1.0	11.4		BR4	5
114.51-2		6.7	3.6	0.7	11.0	21.7	BR4	7-
164.51-2		12.2	1.5	0.5	14.2	18.6	R2	8+
222.51-9	4.4	10.9	2.4	0.5	18.2	17.4	BR4	9-
20.52-2		13.0	2.4	0.4	15.8	19.2	R2	8+
46.52-4		12.8	4.7	1.1	18.6	19.7	R5	8
95.52-2	3.0	10.4	3.3	0.7	17.4	18.2	R7	8+
95.52-4		13.0	3.6	0.7	17.3	19.7	R7	9
106.52-3		7.6	3.5	0.5	11.6		R5	6
107.52-3		12.7	2.4	1.0	11.1	18.0	BR5	8-
111.52-1		3.0	3.6	0.5	7.1		R2	5
112.52-3		6.7	3.4	0.5	10.6		R4	6
315.48-3X		13.9	5.6	1.3	20.8		BR7	8-
29.53-1	2.4	10.8	1.9	0.4	15.5	17.5	R2	7-
102.53-8		6.6	6.1	1.1	13.8		BR7	6-
133.53-1		12.5	3.7	1.5	17.7		R4+Net	6
159.53-1		9.7	5.7	0.5	15.9		R1	4
165.53-2					6.5*		R2	5
114.53-B1		14.1	3.0	0.5	17.6		BR7	6
184.53-1		4.7	1.8	0.5	8.2		BR6	5
81.54-2		9.4	5.8	0.6	15.8		R3	4
88.54-1		8.8	4.4	0.5	13.7		R6	6
168.54-1		6.3	4.0	0.6	10.9		PR3	4
19.55-3		15.1	4.6	0.5	22.0	17.4	OR1	8
78.55-1		12.4	4.8	0.7	17.9		BR7	6
78.55-2		15.1	4.6	0.5	20.2	19.8	OR1	9-
315.48-3X		14.7	4.8	1.1	20.6	19.9	R5+net	7
79.55-1		12.4	4.7	0.8	17.9		BR5	6
80.55-1		13.8	2.2	0.5	16.5	19.0	BR6	9
81.55-2		3.9	6.2	1.8	11.9		BPR7	4
81.55-5		10.4	4.8	1.3	16.5	23.4	R6	8
83.55-12		14.0	4.5	0.8	19.3	18.2	R3	7
85.55-1		11.6	2.7	0.5	14.8	21.4	BR7	9-
85.55-2		5.8	3.2	0.4	9.4		R3	6
88.55-1		13.2	2.3	0.4	15.9	16.9	R8	9

continued

Leeper, table 4 continued.

89.55-9		7.0	6.2	0.7	13.9	-	R7	5
112.55-2		8.5	6.4	2.3	17.2	18.9	BR7	8
140.55-1		7.6	5.2	1.4	14.2		OR1	5
182.55-1		10.6	4.3	0.6	15.5	21.6	BR7	7-
182.55-4		8.8	4.3	0.5	13.6	20.9	R6	7-
183.55-3	1.5	10.4	4.4	0.8	17.1	17.2	R5	7-
186.55-3	3.2	12.7	3.5	1.5	20.9	19.4	BPR7	9-
195.55-4		16.0	1.5	0.6	18.1	19.0	R5	9
196.55-2	5.7	11.4	1.3	1.0	19.4	17.6	R6	8
196.55-3		14.7	5.1	0.7	20.5	17.4	BR6	7+
199.55-1		12.2	3.5	0.8	16.5	17.7	R6	8-
201.55-1		14.9	4.8	0.7	20.4	18.3	BR7	7
216.55-1		8.3	1.0	0.3	9.6	20.8	BR7	8
216.55-5		9.0	6.4	0.5	15.9		R6	6
280.55-2		8.7	4.8	0.2	13.7	19.9	PR7	7+
284.55-1		11.4	3.4	0.5	15.3		R4	6
288.55-1		15.1	3.8	0.5	19.4	18.3	BR4	7+
308.55-3	3.7	6.0	4.0	1.0	14.7	17.0	BPR6	8+
318.55-1		14.6	3.2	0.5	18.3		R1	6
318.55-2		12.8	2.8	1.1	16.7		R2	6
396.55-1	2.5	10.5	4.0	1.0	18.0	17.2	BR7	7+
396.55-3	3.4	12.6	4.0	1.1	21.1	19.0	BR7	9-
396.55-6		9.8	5.5	1.5	16.8	18.1	R6	7-
396.55-13		4.8	5.4	2.7	12.9		R5	6-
396.55-25		5.7	2.0	0.6	8.3		BR5	6
396.55-30	1.8	9.8	3.3	1.5	16.4	16.8	R6	9-
398.55-14		9.6	1.8	0.9	12.3	19.1	BR7	8
412.55-2		6.6	6.4	2.2	15.2		BR7	6
45.47-7X	8.0	8.2	1.0	0.3	17.5	17.6	R7	9-
Haig	2.0	7.6	2.3	0.3	12.2	17.4	W	9
28.51-4		6.7	4.7	1.0	12.4	19.2	WRus.	8
77.51-2		8.7	2.8	1.7	13.2	20.2	WRus.	8
					12.9		W	5

* Yield one plot only

1/3 plots, 5 hills each

2/1 = light red; 9 = dark red

3/1 low; 9 high rating

TEXAS

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Screening and Evaluation of Potato Varieties and Breeding Lines

In 1957-58 a more intensive State wide potato breeding program was instigated in Texas. The objectives of this program are: (1) To determine the potential yield and market quality of available potato strains for spring production in Texas; (2) To evaluate the better adapted strains for resistance to diseases commonly prevalent in Texas; and (3) To determine the factors influencing yield and improve general cultural practices in local growing areas. In carrying out these objectives we propose to conduct a continuous screening program of breeding lines in an effort to obtain strains adapted to our growing areas. To evaluate the breeding lines for disease resistance and to increase the promising lines and conduct yield trials using the best adapted commercial varieties as checks. From a cultural standpoint, we propose to conduct tests of different row spacings and spacing of seedpieces within row in order to determine the most profitable spacing for good yields at the lowest per unit cost.

The tests conducted the past season included plantings in 8 locations, from the Lower Rio Grande Valley area to the College Station area. Five-hill plantings were made at most locations of 400 or more breeding lines obtained from Akeley and Kehr. In addition to these 9 to 10 thousand seedlings were grown in the Laredo area and a variety and spacing test in the Lower Valley. A few breeding lines were grown in nematode infested soil in the Lower Valley to check for nematode resistance. A few of the golden nematode resistant lines also showed promise of having resistance to the root knot and meadow nematodes.

The planting and harvesting dates for the various locations are as follows:

Location	Planting date	Harvesting date
Lower Valley	January 25, 1958	April 30, 1958
Laredo	January 21, 1958	May 13, 1958
Experiment Station	January 30, 1958	May 20, 1958
Batesville	February 4, 1958	May 27, 1958
College Station	March 3, 1958	June 10, 1958

The most commonly prevalent disease observed the past season was Curly Top. This disease was especially severe in one of the Lower Valley plantings. An effort was made to rate the breeding lines on the basis of severity of Curly Top. Based on the single year record it would appear that there is varietal differences in resistance or at least varietal tolerance to this disease.

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6/ Agricultural Agent, Missouri Pacific R.R., Houston, Texas
7/ Horticulturist, American Refrigerator Transit Company, Harlingen, Texas

Texas table 1. Evaluation[1] of Potato breeding lines from Maine, 1957-58-(only lines requested for repeat trials included in table)

Pedigree No.	Parentage	Resistance to:	Plant[4] Maturity[2]	Plant[4] Vigor[3]	Skin Color	No. Repeats[5]	Recommendation
B 313-21	Sequoia x 96-56	Bl. & hopper burn	3	3	white	3	repeat
B 605-16	Pungo x 96-56	Bl. & A	2	3	"	1	"
B 929-3	792-88 x 81-40	Bl., sc., X & A	3	2	"	1	discard
B 962-3	81-40 x (X245-186)	Bl., sc. & A	2	2	"	2	repeat
B 2368-4	Pontiac x 400-1	Sc.	3	3	red	5	"
B 2368-11	" x "	Sc.	3	3	"	1	discard
"	" x "	Sc.	2	2	"	1	repeat
B 2879-4	381-2 x 874-15	Sc.,v.wilt & Y	2	2	"	2	"
B 3114-6	503-70 x 991-13	Bl.,sc.,r.rot & Y	2	3	white	4	"
B 3139-24	607-56 x 402-1	" "	2	3	"	1	discard
B 3170-33	962-3 x 991-13	Bl., sc.	3	3	"	1	repeat
B 3403-3	922-3 x 929-22	Bl., sc. & Y	2	2	"	1	discard
B 3406-1	922-18 x 528-170	Bl., Sc.	3	3	"	1	"
B 3428-20	606-37 x 929-32	Bl., sc., X & A	3	3	"	1	repeat
B 3495-3	922-6 x 2968-31	Bl.	3	2	"	2	"
B 3537-32	606-37 x 24-58	Bl., X & l. roll	3	3	"	1	discard
B 3584-5	3014-10 x 929-32	Bl., Sc.	2	3	"	1	"
"	" "	Bl., Sc.	2	3	"	1	"
B 3599-8	2935-7 x 3021-3	Bl., Sc. & Y	3	2	"	4	repeat
B 3626-13	595-76 x 2067-52	Bl., Sc., v.wilt, X,Y & A	3	3	"	1	discard
B 3626-15	" x "	Bl., Sc., v.wilt & A	3	4	"	1	repeat
B 3627-18	606-37 x 2067-52	Bl., Sc., X, Y & A	3	2	"	1	discard
B 3643-2	NOB 3018-2 Rx 2997-9	A & Y	2	3	red	1	"
B 3725-1	Ac.25951 x 96-56	Bl., Sc. & A	3	3	white	1	"
B 3819-17	792-94 x 24-58	V.wilt, X & A	3	2	"	1	"
B 3832-7	294-3 x 3139-24	Bl., Sc. & A	2	3	"	1	repeat
B 3833-20	294-3 x 2209-25	Y & A	2	3	"	1	discard
B 3833-24	" x "	Y	2	3	"	2	repeat
B 3835-3	ND 457-1 x 2359-84	L. roll & A	3	2	"	2	"
B 3837-11	595-76 x 294-38	Bl., Sc., v.wilt & A	3	3	"	2	"
B 3849-10	2834-3 x 3186-6	Sc., Y & A	3	3	"	1	discard
B 3854-6	991-14 x Teton	Bl., Sc. & A	2	2	"	2	repeat
B 3856-7	3021-3 x "	r. rot	3	3	"	1	discard
B 3857-20	Saranac x 929-32	Bl., Sc. & r. rot	2	3	"	1	"
B 3869-7	3160-12 x 355-24	Bl. and r. rot	2	2	"	1	"
B 3871-6	595-76 x 3139-24	Bl., Sc. & v. wilt	3	3	"	1	repeat

Texas table 1, continued.

B 3872-6	606-37 x 3139-24	Bl., Sc. & r. rot	3	2	white	2	repeat
B 3884-2	2131-3 x Centifolia	Sc.	2	3	red	2	"
B 3884-3	" x "	Sc.	3	2	"	1	discard
B 3900-3	2331-5 x 3139-24	Bl., sc. & A	4	3	"	1	"
B 3903-1	LaSoda x 2368-4	Sc. & A	3	3	"	1	"
B 3907-1	" x "	Sc. & A	3	3	"	3	repeat
B 3950-1	595-76 x Ac.25976	Bl., A & X	3	3	white	1	"
B 3960-8	Ac. 25953 x "	Bl.	3	2	"	1	discard
B 4082-5	Cherokee x 81-40	Sc.	2	4	"	1	repeat
B 4083-1	Chippewa x Cherokee	Bl. & Sc.	2	4	"	1	discard
B 4083-3	" x "	Bl. & Sc.	3	3	"	2	repeat
B 4083-4	" x "	Bl. & Sc.	3	3	"	1	"
B 4084-2	Chippewa x 81-40	Sc.	2	3	"	1	discard
B 4084-7	" x "	Sc.	2	3	"	1	repeat
B 4084-8	" x "	Sc. & X	2	3	"	2	"
B 4085-3	" x 528-170	Sc. & v. wilt	2	3	"	1	discard
B 4085-6	" x "	Sc., v. wilt & X	2	4	"	1	"
B 4087-2	Early Gem x 2834-3	Sc.	4	3	russet	1	repeat
B 4087-4	" " x "	Sc.	2	3	"	1	discard
B 4087-5	" " x "	Sc.	3	3	"	1	repeat
B 4090-5	Kennebec x 81-40	Sc. & v. wilt	2	3	white	1	discard
B 4093-2	Menominee x 881-12	Sc. & v. wilt	3	3	"	2	repeat
B 4093-11	" x "	Sc. & v. wilt	2	3	russet	1	"
B 4093-14	" x "	Sc. & v. wilt	3	3	white	3	"
B 4093-20	" x "	Sc.	3	3	russet	1	"
B 4094-1	Russet Rural x 3310-5	Sc.	2	4	"	1	"
B 4094-10	" " x "	Sc.	2	3	"	3	"
B 4094-12	" " x "	Sc.	2	3	white	1	discard
B 4094-18	" " x "	Sc.	3	3	russet	3	repeat
B 4094-19	" " x "	Sc.	4	3	"	2	"
B 4094-22	" " x "	Sc.	3	3	"	1	discard
B 4094-23	" " x "	Sc.	3	3	"	3	repeat
B 4100-7	792-88 x 2359-84	V. wilt	3	2	white	1	discard
B 4102-16	792-94 x Katahdin	Y	3	3	"	1	"
B 4105-14	" x 3139-24	Sc. & v. wilt	2	3	"	1	"
B 4105-18	" x "	Bl., sc. & X	4	4	"	3	repeat
B 4113-1	1395-57 x 2834-3	Sc.	1	3	russet	2	"
B 4113-2	" x "	Sc.	2	3	"	1	discard
B 4113-4	" x "	Sc.	1	3	"	1	"

continued

Texas table 1, continued.

B 4113-5	1395-57 x 2834-3	Sc.	1	3	russet	1	repeat
B 4114-1	2331-5 x DYK 2336	Sc.	2	2	Red	2	"
B 4114-3	" x "	Sc.	2	3	"	1	discard
B 4114-6	" x "	Sc.	3	3	"	1	"
B 4116-2	2359-84 x 2834-3	Sc. & l.roll	3	3	white	1	repeat
B 4116-5	" x "	Sc. & l.roll	3	3	"	2	"
B 4116-7	" x "	Sc.	2	3	"	1	discard
B 4116-8	" x "	Sc.	3	3	"	1	"
B 4119-1	2368-4 x 3186-6	Sc. & Y	3	3	Red	2	repeat
B 4119-3	" x "	Sc.	2	3	"	2	"
B 4119-4	" x "	Sc. & Y	3	3	"	1	discard
B 4119-5	" x "	Sc. & Y.	2	4	"	1	repeat
B 4128-2	2962-6 x 2969-15	Bl., Sc.	3	3	white	3	"
B 4130-7	3014-10 x 929-13	Bl., Sc.	2	3	"	2	"
B 4132-3	3097-82 x Katahdin	Bl., Sc.	3	3	"	1	"
B 4132-5	" x "	Bl., Sc.	2	3	"	2	"
B 4132-14	" x "	Bl., Sc.	2	3	"	1	"
B 4132-25	" x "	Bl., Sc.	1	3	"	1	discard
B 4134-24	3186-6 x 3139-24	Sc.	3	3	"	1	"
B 4134-34	" x "	Bl., Sc.	3	3	"	1	"
B 4135-2	3139-24 x Cherokee	Bl., Sc.	3	3	"	1	"
B 4144-4	47156 x 2834-3	Sc., v.wilt, l. roll	3	3	"	2	repeat
B 4145-1	Houma x 3195-3	Sc.	3	3	russet	1	discard
B 4154-2	24-58 x 3195-3	Sc., v. wilt, l. roll	3	3	"	2	repeat
B 4160-13	595-76 x 3508-8	Bl., sc., v. wilt	3	3	white	1	discard
B 4176-6	3508-8 x Menominee	Bl., sc., v. wilt	3	3	"	1	"
B 4214-3	3516-11 x Ac. 25976	Bl., Sc.	2	2	"	1	"
B 4229-1	Cayuga x Cherokee		3	3	"	1	"
B 4233-2	Delus x "		3	3	"	2	repeat
B 4241-2	Kennebec x 3299-13		1	1	"	1	discard
B 4246-1	Mohawk x Merrimack		3	2	"	1	repeat
B 4250-1	ND 457-1 x 3139-24		3	3	"	1	discard
B 4269-2	355-24 x 3139-24		3	2	"	1	"
B 4283-2	(X 627-164) x 3139-24			-	"	1	"
B 4298-2	991-14 x 3139-24		3	2	"	1	repeat

1/ Lines rated from 1 to 5; 1 = best and 5 = poorest.
2/ Rated 1 to 5; 1 = early, 5 = late.
3/ Rated 1 to 5; 1 = very vigorous, 5 = very poor (plant too small).
4/ Based on plantings at Laredo, Crystal City and Batesville.
5/ Number of repeats requested, based on 6 locations.

Texas table 2. Evaluation of potato breeding lines from Iowa, 1957-1958.

Pedigree No.	Parentage	Maturity*	Vigor**	Rating***	Recommendation
I 801-10	B 595-76 x B 67-11	4	3	3R	repeat
I 8140-1	45-11-26 x B 67-11	3	2	4	discard
I 1111-10	B 595-76 x I 872-4	3	3	3R	repeat
I 803-1	B 595-76 x B 76-23	3	3	4	discard
I 872-4	B 762-1 x Osage	2	3	3R	repeat
I 913-2	B 76-23 x B 67-11	4	3	3	discard
I 1027-1	B 595-76 x Progress	3	3	4	"
I 1084-1	N 225-43 x B962-9	3	4	5	"
I 1155-2	Saco x Osage	2	3	4	"
I 1181-1	B 991-14 x B 2903-17	3	3	5	"
I 1212-1	Minn 43.46-6-48 x I 947-10	2	2	3R	repeat
I 1213-2	I 976-3 x I 947-10	3	3	3	discard
I 1379-1	N.D. 457-1 x Osage	3	3	4	"
I 1402-3	B 595-76 x I 1077-14	3	2	3R	repeat
I 1402-5	B 595-76 x I 1077-14	3	3	4	discard
I 1410-2	I 1077-14 x I 1107-4	3	3	4	"
I 1412-2	I 1077-W 28-5 x I 902-3	3	2	4	"
I 1419-6	X 927-3 x I 1077-W-28-5	3	3	5	"
I 1422-1	I 1077-W-28-5 x Osage	3	3	3R	repeat
I 1422-2	" "	3	3	3R	"
I 1422-3	" "	3	3	3	discard
I 1422-4	" "	3	2	3R	repeat
I 1426-1	B 2875-8 x I 1049-3	3	2	3R	"
I 1441-4	X 927-3 x I 902-2	4	3	5	discard
I 1467-1	I 781-7 x I 1106-1	4	2	4	"
I 14141-1	X 927-3 x Osage	4	3	4	"
I 14141-2	" "	3	4	3R	repeat
I 14147-2	B 3131-8 x I 1049-3	3	2	4	discard
I 5560-1	I 1077-W-28-5 x Katahdin	3	3	4	"
I 5560-3	" "	2	2	4	"
I 5583-1	I 1107-3 x "	3	3	4	"
B 2896-10	Kennebec x B 445-41	2	3	3R	repeat
CS 1-Ia 2	B 2083-7 x (X927-3)	3	4	4	discard
CS 4-Ia 2	CS 11626 x B 991-3	3	4	4	"
CS 10-Ia 2	B 3408-27 x (X627-164)	5	4	4	"
B 2368-4	Pontiac x B400-1	3	3	3R	repeat

continued

Texas table 2, continued.

B 3124-Ia 3	B 595-76 x B 606-3	3	3	4	discard
B 3452-10	B 2162-36 x B 2162-18	4	3	3	"
B 3627-N. D.	B 606-37 x B 2067-52	3	3	4	"
B 3692-4	B 2919-1 x AC 25953	3	2	4	"
Manota	Minn. 11-1-2 x Minn. 9-4	3	3	4	"
La 1354	Pontiac x Minn 92-36-5	3	2	3R	repeat
F 29-1		3	2	3R	"

*Rated 1 to 5; 1 = early, 5 = late
**Rated 1 to 5; 1 = very vigorous, 5 = very poor (plant too small
***Rated 1 to 5; 1 = best, 5 = poorest

Texas table 3. Selections made from single-hill seedlings grown in greenhouses at Beltsville, Maryland and Ames, Iowa, and planted at Laredo, 1957-58.

Lot Number	Parentage	Resistance in cross	Tuber Color	Tuber Number	Hill Weight (lb.)
BL 4472-1	B 595-76 x B 3944-11	lb, Sc, Vw, CRS, Nem.	white	6	1/2
BL 4472-2	" "	" "	"	10	3/4
BL 4476-1	B 606-37 x B 3944-11	lb, RR, X, A, Nem.	"	14	1 1/2
BL 4476-2	" "	" "	"	4	1/2
BL 4476-3	" "	" "	"	5	1 1/2
BL 4476-4	" "	" "	"	13	1 1/2
BL 4476-5	" "	" "	"	13	2 1/4
BL 4476-6	" "	" "	"	8	1 1/2
BL 4479-1	B 991-14 x B 3556-112	lb, Sc, Vw, Lr, X, A	"	7	1/2
BL 4492-1	B 3397-17 x B 3391-19	Vw, Lr, A	"	3	1
BL 4492-2	" "	"	"	14	1 1/2
BL 4492-3	" "	"	"	12	2
BL 4495-1	B 3428-20 x B 3139-24	lb, Sc, RR, VW, X, A	"	15	2
BL 4495-2	" "	"	"	8	1 1/4
BL 4495-3	" "	"	"	8	1 1/2
BL 4576	B 595-76 x Katahdin	lb, Sc, Vw, Lr, X, A	"	12	1 1/2
BL 4576-2	" "	"	"	6	1 1/4
BL 4590-1	Pontiac x B 2368-4	Sc, A	red	11	1
BL 4590-2	" "	"	"	13	1
BL 4593-1	Triumph x B 2368-4	Sc, A	"	9	1
BL 4593-2	" "	"	"	9	2 1/4
BL 4593-3	" "	"	"	13	1 3/4

BL 4593-4	Triumph x B 2368-4	Sc, A	red	15	1 1/2
BL 4593-5	" "	"	"	13	1 1/2
1L 55104-1	I 1114-2 x I 1077-14	Sc, 1b, Xi	white	5	3/4
1L 55104-2	" "	"	"	15	1 1/2
1L 55104-3	" "	"	"	9	1 1/4
1L 5681-1	I 1107-3 x I 1077-W-28-5	"	"	5	1/2
1L 5681-2	" "	"	"	5	3/4
1L 56188-1	B 2368-4 x B 3131-8	"	red	6	1/2
1L 56256-1	B 3556-1 x Katahdin	Sc, 1b, Xi, Y	white	4	1
1L 56287-1	X 927-3 x La. 1859	Sc, 1b, Lr	"	24	1 1/2
1L 56287-2	" "	"	"	13	1
1L 56287-3	" "	"	"	15	2
1L 56287-4	" "	"	"	15	1 3/4
1L 56287-5	" "	"	red	14	2 1/4
1L 56287-6	" "	"	white	11	1 1/2
1L 56443-1	Red cote x La. 1859	Sc, 1b	red	3	1/2
1L 56443-2	" "	"	white	3	1/2
1L 5711-1	I 801-10 x I 1077-W-28-5	Sc, 1b, Xi	"	6	1 1/4
1L 5742-1	" "	"	"	9	1 1/4
1L 5742-2	" "	"	"	4	1 1/4
1L 5742-3	" "	"	"	6	1 1/2
1L 5742-4	" "	"	"	13	1
1L 5742-5	" "	"	"	7	1
1L 5757-1	I 1106-5 x X 1077-W-28-5	"	"	7	3/4
1L 5757-2	" "	"	"	10	1
1L 5774-1	I 1133-1 x Katahdin	"	"	14	1 1/2
1L 5774-2	" "	"	"	27	2 1/4
1L 5774-3	" "	"	"	10	1 1/2
1L 5774-4	" "	"	"	26	1 1/2
1L 57410-1	La. 1354 x I 1027-18	"	red	6	1 1/4
1L 57410-2	" "	"	"	6	1 1/2
1L 57413-1	" x N.D. 2910-1	Sc	white	3	1/2

Texas table 4. Variety and spacing test (Young Farm), Harlingen, Texas, 1958[1/]

Variety	32" Rows		36" Rows		40" Rows		Variety Average	
	Hills 8"	Hills 10"	Hills 8"	Hills 10"	Hills 8"	Hills 10"	Hills 8"	Hills 10"
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
B 2368-4	36.0	37.3	40.5	37.8	39.0	35.5	38.5	36.9
B 605-10	27.5	26.2	33.8	28.7	31.0	28.9	30.8	27.9
Merrimack	28.4	24.4	27.3	23.9	28.4	25.4	28.0	24.6
B 73-3	25.1	25.5	24.0	23.3	25.3	24.0	24.8	24.3
Katahdin	29.4	28.3	28.8	24.8	30.8	25.9	29.7	26.3
Plymouth	29.5	25.0	29.9	25.3	27.3	24.0	28.9	24.8
Kennebec	29.8	32.0	28.0	26.9	30.8	28.4	29.5	29.1
50 B 9	24.8	19.4	21.5	18.4	19.5	12.4	21.9	16.7
Ave. Hills	28.8	27.3	29.2	26.1	29.0	25.6	29.0	26.3
" Rows	28.05		27.65		27.30		27.65	

1/ Average weights for 2 replications.

VIRGINIA
(Blacksburg)
Flood S. Andrews

Twelve potato varieties were grown in replicated test plots at the Virginia Agricultural Experiment Station, Blacksburg, Virginia in 1958.

Experimental Procedure

Soil: Groseclose silt loam pH 6.2; Previous crop: Tomatoes and cover crop; Plot size: 3.5 x 30 feet; Plot arrangement: Randomized block, replicates, four; Tubers: Supplied by U. S. Plant Industry Station, Beltsville, Maryland. Cut to 1½-ounce pieces; Spacing: 12 inches in the row; Fertilization: 1,500 pounds 5-10-5, applied one half broadcast and harrowed into the soil the remainder in the row in bands at the time of planting; Planting date: May 12; Cultivation: shallow, frequently enough to control weeds; Pest control: DDT plus Malathion; Harvest date: September 16.

No sign of virus diseases were found in any variety.

Results

At harvest, potatoes were graded into U. S. No. 1, U. S. No. 2, and culls. Culls were few, principally undersize and second, growth. The yields of U. S. No. 1 and U. S. No. 2 are shown in Andrews table 1.

Andrews table 1. Yield per acre and total solids of twelve varieties of potatoes tested in 1958.

Selection or Variety	Mean yield per acre					Total solids
	U.S. No.1		U.S. No.2	Total		
	Cwt.	1/	Cwt.	Cwt.	Pct.	1/
Pontiac	318.5	a	17.1	335.6	16.9	e
Boone	229.7	bc	14.5	244.2	19.2	bc
Kennebec	248.9	b	24.9	273.8	19.4	b
Plymouth	145.2	e	10.0	155.2	19.4	b
Saco	233.5	bc	30.0	263.3	19.4	b
Pungo	176.8	cde	16.1	192.9	20.1	b
Merrimack	256.7	b	21.3	278.0	21.6	a
Cherokee	151.9	de	32.7	184.6	18.4	cd
Delus	155.5	de	13.5	169.0	22.0	a
Cobbler	207.2	bcde	42.0	249.2	19.2	b
50-B9-8	214.2	bcd	20.2	234.4	18.2	d
B 605-10	174.2	cde	18.1	192.2	20.1	b

1/ Statistical significance means not followed by the same letter are significantly different.

Pontiac produced a significantly higher yield of U. S. No. 1 potatoes than any other variety. Merrimack and Kennebec produced significantly higher yields than Pungo, B 605-10, Delus, Cherokee and Plymough. Plymouth produced the lowest yield. Delus and Merrimack had the highest total solids. Pungo, B 605-10, Kennebec, Saco, Plymouth and Cobbler had higher total solids than Cherokee, 50-B9-5 and Pontiac. Pontiac had the lowest total solids.

Potato Seed Source Studies

Potato seed source studies are being conducted by the Department of Horticulture, Blacksburg, Virginia in cooperation with the Virginia Truck Experiment Station and the Florida Agricultural Experiment Station at Hastings and Fort Pierce, Florida.

The purpose of the experiment is to evaluate the mertis of Virginia-grown-seed potatoes and productive capacity when grown at Blacksburg and Norfolk, Virginia and at Fort Pierce and Hastings, Florida and to determine whether high quality relatively disease-free, high-yielding seed potatoes can be successfully grown in certain areas of Virginia.

Seed potatoes of 5 varieties grown in Maine and the same 5 varieties grown at Blacksburg, Virginia were held in storage at 40° F. from harvest in September until planting time. Subsequently 5 varieties from the 2 seed sources were tested for yield and the presence of diseases at Blacksburg, Virginia. These varieties were tested at Norfolk, Virginia and 3 were tested at Fort Pierce and Hastings, Florida. All test plots were randomized and replicated 4 to 6 times. At harvest yield was recorded in the number of 100-pound bags per acre.

Soil at Blacksburg was a Groseclose silt loam, at Norfolk, a Norfolk fine sand and at Hastings a Braden fine sandy loam.

Plot size at Blacksburg was one row 3½ feet x 30 feet. At Norfolk 2 rows 7 feet x 30 feet and at Hastings 1 row 40 inches by 12 feet.

Fertilizer, cultivation and pest control practices recommended for each location were followed.

Planting dates: Blacksburg, May 13, Norfolk, March 12, Hastings, January 16.
Harvesting dates: Blacksburg, September 10, Norfolk, June 24, Hastings, May 19.

Results

At Blacksburg, Virginia, Maine-grown Pontiac produced significantly higher yields than Virginia-grown Pontiac. There was no difference in yield between seed sources of Cobbler, Pungo, Sebago or Kennebec.

Pontiac and Kennebec produced significantly higher yields than Sebago, Pungo, and Cobbler. Cobbler produced the lowest yields.

Virginia-grown Cobbler, Pungo, and Kennebec stored at 40°, produced significantly higher yields than the same varieties stored at 55°F. Virginia-grown Pontiac and Sebago stored at 55° F. produced significantly higher yields than the same varieties stored at 40°F.

At Norfolk, Virginia, Virginia-grown Pungo and Kennebec produced higher yields than Maine seed of the same varieties. Cobbler produced significantly higher yields than Pungo or Kennebec.

Cobbler, Pungo, Kennebec stored at 40° F. produced significantly higher yields than the same varieties stored at 55° F.

At Hastings, Florida, all potato plants were injured by cold. The plants of Virginia-grown seed were apparently injured more than the Maine-grown. The yield data show that Maine-grown Pontiac produced significantly higher yields than the Virginia-grown seed of the same variety. The difference was apparently due to cold injury. There was no significant difference in yield between seed sources of other varieties.

Considering the influence of storage temperature on yields of different varieties at different locations, the results seemed to be conditioned by variety and by length of time in storage.

Andrews table 2. The influence of seed source, variety and location on yield of potatoes per acre at Blacksburg, Norfolk, and Hastings, Florida, 1958.

Variety	Source	Blacksburg, Va. U.S. No. 1 Cwt.	Norfolk, Va. U.S. No. 1 Cwt.	Hastings, Fla. U.S. No. 1 Cwt.
Cobbler	Maine	172.4 d 1/	213.1 a 1/	
"	Virginia	187.8 cd	209.0 a	
Pungo	Maine	223.8 bc	157.2 c	
"	Virginia	245.1 bc	165.0 b	
Kennebec	Maine	274.8 ab	113.4 d	150.0 b 1/
"	Virginia	315.5 a	152.3 c	145.0 b
Sebago	Maine	214.2 cd		168.0 a
"	Virginia	146.8 e		115.0 c
Pontiac	Maine	333.4 a		178.0 a
Pontiac	Virginia	235.4 bc		60.0 d

1/ See footnote Andrews table 1.

Andrews table 3. Influence of storage temperature on yields of potatoes per acre at Blacksburg, Norfolk and Hastings, Florida, 1958.

Variety	Storage Temp.	Blacksburg, Va. Cwt.	Norfolk, Va. Cwt.	Hastings, Fla. Cwt.
Cobbler	40°F.	187.8 cde 1/	209.0 a 1/	
"	55°F.	168.2 de	179.1 b	
Pungo	40°F.	245.1 bc	165.0 c	
"	55°F.	216.0 bcde	119.5 f	
Kennebec	40°F.	315.4 a	152.3 d	145.0 a 1/
"	55°F.	223.2 bcd	137.5 e	
Pontiac	40°F.	235.4 bcd	--	66.0 b
"	55°F.	298.2 ab	--	105.0 ab
Sebago	40°F.	146.8 f	--	115.0 ab
"	55°F.	166.4 e	--	

1/ See footnote Andrews table 1.

VIRGINIA
(Norfolk)
M. M. Parker

Selected seedling lots of potatoes obtained from the U.S.D.A. through the National Potato-Breeding Program and other States were planted at Painter on the Eastern Shore of Virginia in comparison with locally important, named varieties grown for commercial purposes. At Norfolk, across Chesapeake Bay from the Eastern Shore, named varieties alone were tested. Records taken included yields and appearance of the tubers considered for their fresh-market-use, and value for processing. Most of the potatoes tested were in the first and second early-maturity group.

The seed was planted April 3 at Painter which, because of a prolonged wet spell, was nearly three weeks later than the usual date of planting in that section. The plots were harvested July 7 (within a few days of the normal harvesting time). The short-growing season caused comparatively low yields but not as low as they might have been because good growing weather, including favorable soil moisture and cool night temperatures, occurred during the growing season. These good weather factors tended to off-set the short-growing period. A more important factor than the delay in planting, however, was that the seed had been cut in preparation for planting at the normal time, and then had to be held nearly 3 weeks before planting. Those lots, therefore, that were susceptible to seed-piece decay, or partial decay, were penalized insofar as yields are concerned because they were affected adversely in rate of come-up and in rapidity of plant growth.

The seedpieces were dropped by hand at a spacing of 14 inches in rows 3 feet apart. The single-row plots were 41 feet long and there were 4 replications (not randomized) of each plot. Only 2 of the replications were used in obtaining yield records because the other two were in land a few inches lower in elevation, which proved to be decidedly detrimental to satisfactory growth under the wet soil conditions that followed planting.

Cultural treatments in growing the potatoes consisted of applying a 5-10-5 fertilizer mixture in bands on each side of the seedpiece at the rate of 2,000 pounds per acre. The plots were irrigated once which was all that was necessary in 1958. Insects were controlled by insecticides applied at the proper time. Control measures for blight were not used since this disease seldom affects the early crop of potatoes in eastern Virginia.

Shortly after the lots were harvested they were evaluated for fresh-market-use. The evaluation factors consisted of the shape, smoothness, and color of the potatoes. In the evaluation process the potatoes were divided into 3 groups: named varieties, white seedling selections, and red seedling selections. Tests for their processing value were also made; however, the results of these tests are not yet available for publication.

In the rating of the named varieties for appearance for fresh market desirability, Tawa was first and Keswick second. Saco, because of its very poor shape and second-growth protuberences, was placed last. This variety, even though it gave good yields, produced very few potatoes that could be classed as suitable for market acceptance. (Parker table 1).

Parker table 1. Potato yield trials at Painter, and Norfolk, Virginia, 1958.

Named Varieties	Seed Source	Yield per acre Size A Cwt.	Size B Cwt.	Total Cwt.
Painter, Va.				
Pungo	Maine	140	20	160
Delus	Maine	140	15	155
Plymouth	Maine	139	15	154
Saco	Maine	129	27	156
Keswick	Maine	121	16	137
Katahdin	Canada	119	15	134
Onaway	Michigan	110	15	125
Cobbler	Canada	108	12	120
Tawa	Maine	98	22	120
Pungo*	Virginia	74	20	94
Seedling Selections (White)				
B 605-10		182	19	201
B 2894-24		175	16	191
B 3319-30		158	33	191
B 73-3		134	23	157
Penn. State 4 R M 3		116	41	157
B 75-4		86	17	103
Seedling Selections (Red)				
B 2368-4		199	15	214
B 2368-13		171	20	191
B 2874-4		163	44	207
Norfolk, Va.				
Plymouth	Maine	219	15	234
Cobbler	Canada	199	16	215
Pungo	Maine	176	26	202
Katahdin	Canada	175	14	189
Pungo*	Virginia	152	12	164

* Some eastern Virginia growers make a practice of planting local spring crop Pungo potatoes grown from certified northern seed as a second crop planted in early August and harvested in early November. These potatoes are then used to plant the following year's crop. However, very low yields sometimes results from the procedure because of seed infections of some of the virus troubles (mostly leafroll).

In the seedling lots of white potatoes B 605-10 placed first, B 75-4, second, and B 3319-30, third. B 73-3 was put last in this list because in this test it was small, off-shape, and had some scab present.

In the red seedling lots B 2368-4 was first, B 2368-13 second and B 2374-4 third. B 2368-4 was placed first principally because of its brilliant red color. Actually, there is very little demand for red potato seed in Virginia and therefore it is doubtful that local growers would be interested in B 2368-4 even though it did have an exceptionally good color and did produce very satisfactory yields.

WASHINGTON

William G. Hoyman

Transfer to the Irrigation Experiment Station, Prosser, Washington, was effective in sufficient time to establish field plots and to continue the disease-resistance program that had been conducted in the Red River Valley since 1945.

Scab Resistance

Twenty-nine selections and 4 varieties (Washington table 1), including the White Rose check, were included in the National Uniform Scab Trial. The plot was located on the Roza Unit of the Station and in field E-36. Six previous and consecutive crops of scabby potatoes had been grown at this location by Dr. J. D. Menzies. The selections and varieties are listed in the order of their resistance.

Disease Resistance Program

Of the 8,500 seedlings grown on the Roza Unit, approximately 40 percent were furnished by R. V. Akeley. All of these were progenies from parents segregating for resistance to the common pathogens. Special attention was given to the selection of seedlings that were bred for resistance to the leaf roll virus. Two hundred and eighty single hills were selected from this planting for further observation in 1959.

In order to grow large populations of seedlings from true seed, a 96- x 32-foot screen house was constructed. Thirty thousand seedlings were grown in 1958 and another similar screen house will be completed for use in 1959. These facilities will make it possible to grow 60,000 seedlings each year.

Foundation Seed Program

In order to have a source of virus-free seed for Washington certified potato growers, a cooperative project was started with the Washington State Seed Department at Bellingham. Mr. Louis W. King, Washington State Seed Potato Commissioner, obtained the use of land northwest of Bellingham and several miles from farms growing potatoes. The virus-free varieties Kennebec, Red Pontiac, Early Gem, Norgleam and Norland were increased as well as several new selections.

Washington table 1. Common scab readings from the Irrigation Experiment Station, Prosser, Washington.

Variety	Number of Tubers	Number of Tubers Showing Types of Scab Infection					
		0	1	2	3	4	5
B 4087-5	2	1			1		
B 4170-3	14	3	4	3	4		
B 4130-7	34	6	9	14	5		
Early Gem	21	8		3	10		
B 3457-2	44	4	9	19	12		
B 4094-9	18	5			13		
B 4090-5	16				16		

continued

Washington table 1, continued.

ND 3324-2	17				17		
B 4132-23	33	6		1	26		
B 4116-5	41	1	3	8	29		
B 4130-11	15	5		2	7	1	
B 4105-2	11	1	1		8	1	
B 4090-1	33	7	11	1	13	1	
F 29-1	27	4	2		20	1	
White Rose Check	24		3		20	1	
B 4135-2	23	1		1	20	1	
Norland	39	4	1	2	31	1	
B 4093-2	37	1	1	1	33	1	
B 4120-2	26	2	1		20	3	
B 4093-15	34	4	1	3	23	3	
B 4075-1	69	15	13	8	28	5	
B 4093-14	15	2			10	2	1
B 4132-25	36	4	2		27	2	1
B 4207-1	29		1	2	22	3	1
B 4128-14	51	5	3	2	34	6	1
B 4132-14	53	1	7	28	9	7	1
B 605-10	26	5	2	4	12	1	2
Norgleam	24		2	3	13	4	2
B 4093-7	23				9	12	2
B 4134-34	35		2	7	15	8	3
B 3114-67	31	1	4	2	20		4
B 4134-24	38				23	11	4
B 4158-5	88	8		4	48	23	5

WASHINGTON
S. B. Locke

This report will cover two years, 1957 and 1958. The objective remains the same, i.e., to produce a seedling having the main characteristics of the Netted Gem (Russet Burbank) variety combined with leafroll resistance.

The spread of leafroll in the test plots at Pullman was much greater in 1957 and 1958 than in the two preceding years. The mosaics were especially abundant and accounted for the elimination of a great many seedlings.

All but six (in 3 progenies) of the 1,914 seedlings introduced in 1955 have been eliminated after four years' field exposure (Locke table 1). Four were from a single progeny, B2301 (X1276-185 x X157-9), having the highly leafroll-resistant X1276-185 as a parent. However, this was a large progeny, and, percentage wise, produced fewer resistant seedlings than some others. The other two had the highly resistant B24-58 for one parent.

All of the 625 seedlings introduced in 1956 were eliminated at the end of the 1958 season (Locke table 2). Only one had survived the second year of field exposure.

In 1957, 3415 seedlings were introduced into the field test. After two years of field exposure 37, representing seven progenies, survived (Locke table 3).

In 1958, 4018 seedlings were field exposed, and 144, representing 21 progenies survived. Only one progeny was eliminated (Locke table 4).

During four years' testing a total of 9,972 seedlings representing 63 progenies have been field exposed. Of these 187 seedlings remain to be retested in 1959. Only six have survived four years' field exposure to leafroll infection. The remaining 186 have survived only one and two years of exposure, and consequently are not sufficiently tested to be classified as resistant or susceptible.

With respect to the 9,785 seedlings eliminated, many became infected with rugose and mild mosaic, and others were discarded because of undesirable tuber and yield characteristics.

And indication of the degree of field spread of leafroll during the years 1955, 1956, and 1957 is given in Locke table 5.

Locke table 1. Survival of potato progenies under field exposure to infection by leafroll and other viruses, 1955-1958.

Progeny Numbers	Parentage	Field Tested 1955	1956	1957	1958	Surviving thru 1958	
		No.	No.	No.	No.	No.	Pct.
A 316	(Netted Gem x B2361-2)	67	65	16	2	0	
A 317	(A101-17 x B2361-2)	90	83	22	1	0	
A 322	(B2361-2 x B2361-2)	67	48	5	0	0	
A 324	(B2958-2 x A119-15)	113	105	2	0	0	

Locke table 1, continued.

A 326	(A119-15 x B24-58)	30	20	4	1	0	
A 327	(A119-20 x B24-58)	83	64	9	1	1	1.2
A 328	(A101-17 x B24-58)	63	52	12	2	1	1.6
B 2032	(Katahdin x X157-9)	149	19	7	1	0	
B 2193	(Green Mt. x X157-9)	243	77	39	0	0	
B 2195	(Katahdin x X157-9)	155	50	20	2	0	
B 2196	(Mohawk x X157-9)	252	76	41	2	0	
B 2301	(X1276-185 x X157-9)	602	186	88	6	4	0.7
Totals		1914	845	265	18	6	0.3
Percent Eliminated		55.9	29.1	10.2	1.5		

Lock table 2. Survival of potato progenies under field exposure to infection by leafroll and other viruses, 1956-1958.

Number	Parentage	Field Tested 1956	1957	1958	Surviving to 1959 test
		No.	No.	No.	No.
PX 551	(Netted Gem x Redkote)	185	26	1	0
PX 552	(W.P. 332 x Katahdin)	158	45	0	0
PX 553	(W.P. 338 x W.P. 338)	152	13	0	0
PX 554	(W.P. 332 x W.P. 332)	52	4	0	0
PX 555	(Netted Gem x W.P. 337)	38	4	0	0
PX 556	(B2032-32 x B2032-32)	40	2	0	0
Totals		625	94	1	0
Percent Eliminated		95.0	4.8	0.2	0.0

Locke table 3. Survival of potato progenies under field exposure to infection by leafroll and other viruses, 1957-1958.

Progeny Numbers	Parentage	Field Tested 1957	1958	Numbers selected for 1959 test	
		No.	No.	No.	Pct.
A 501	(B24-58 x A177-52)	112	16	1	0.9
A 502	(B2759-5 x A163-17)	135	18	6	4.4
A 504	(B2759-5 x A200-3)	140	6	0	
A 506	(B2759-5 x A180-30)	140	5	0	
B 2192	(Earlaine x X157-9)	202	2	0	
B 2196	(Mohawk x X159-9)	169	32	5	3.0
B 2213	(B247-48 x X157-9)	170	0	0	
B 2215	(B247-48 x Triumf)	67	5	1	1.5

Locke table 3, continued.

B 2240	(B522-33 x X157-9)	110	2	0	
B 2242	(B522-33 x Trimuf)	14	0	0	
PX 561	(Green Mt. x Katahdin)	11	11	0	
PX 563	(Katahdin x Katahdin)	168	1	0	
PX 565	(Katahdin x A324-21)	67	0	0	
PX 566	(Katahdin x A328-23)	179	24	5	2.8
PX 567	(Netted Gem x Katahdin)	9	0	0	
PX 569	(Netted Gem x A327-53)	4	3	0	
PX 5613	(A316-3 x A324-21)	371	16	0	
PX 5614	(A316-5 x A324-21)	17	0	0	
PX 5634	(A317-10 x A324-21)	169	1	0	
PX 5649	(A317-39 x A324-21)	314	3	1	0.3
PX 5671	(A327-9 x A324-21)	472	0	0	
PX 5693	(B137-5 x Katahdin)	439	44	18	4.1
PX 5694	(B2193-48 x Earlaine)	3	0	0	
PX 5695	(B2193-48 x Katahdin)	33	0	0	
Totals		3415	165	37	1.1
Percent Eliminated		95.2	3.7		

Locke table 4. Survival of potato progenies under field exposure to leafroll and other viruses, 1958.

Progeny Numbers	Parentage	1958	Numbers Selected for 1959 test No.	Pct.
A 535		66	3	4.5
A 539		129	8	6.2
A 548		177	9	5.1
A 549		132	8	6.1
A 551		137	6	4.4
A 554		141	11	7.8
B 1202	(X157-9 x X157-9)	202	0	
B 2192	(Earlaine x X157-9)	165	8	4.8
B 2196	(Mohawk x X157-9)	44	3	6.8
B 2207	(Teton x X157-9)	264	12	4.5
B 2213	(B247-48 x X157-9)	66	1	1.5
PX 563	(Katahdin x Katahdin)	115	5	4.3
PX 566	(Katahdin x A328-23)	248	12	4.8
PX 5613	(A316-3 x A324-21)	421	4	1.0
PX 5614	(A316-5 x A324-21)	9	1	11.1

Locke, table 4, continued.

PX 5649	(A317-39 x A324-21)	157	3	1.9
PX 5671	(A327-9 x A324-21)	119	1	0.8
PX 572	(Earlaine x B2193-48)	51	10	6.6
PX 576	(Mohawk x Earlaine)	680	13	1.9
PX 5726	(B2193-48 x Katahdin)	208	17	8.2
PX 5729	(B2193-48 x B24-58)	287	9	3.1
Totals		4018	144	3.6
Percent Surviving		96.4		

Locke, table 5. Leafroll infection in two varieties and one seedling under field exposure at Pullman, Washington.

Variety or seedling	Percent leafroll infection		
	1955	1957	1958
Netted Gem	21.3	92.7	64.0
Katahdin	7.4	50.0	28.0
B579-3	0.0	2.7	0.0

WEST VIRGINIA

M. E. Gallegly

Control of late blight continues to be the main theme of potato disease investigations by the Department of Plant Pathology at West Virginia University. Two approaches are being made, (1) testing of new fungicides and (2) breeding for resistance. The results of the 1958 fungicidal tests showed maneb to be far superior to zineb, nabam and $ZnSO_4$, and any other fungicide tested during this severe blight year. In breeding for resistance, an effort has been made to combine parents both having high field resistance and also giving combinations involving the four dominant genes. In addition, clones bearing at least one new dominant gene derived from *Solanum demissum*, and tentatively labeled Rx, have been back-crossed with selections and varieties of *S. tuberosum*.

Breeding Results

In 1958, 149 selections from 17 families were made from plantings in the Canaan Valley (Davis, W. Va.) and the Tygart Valley (Huttonsville, W. Va.). The family-line plantings were of first-year tubers produced in pots in the greenhouse or of seedlings transplanted in the field. When the pots bearing first-year tubers were harvested in the greenhouse, selection numbers were given to individuals producing more than one tuber. Dr. J. S. Niederhauser of the Rockefeller Foundation in Mexico, kindly accepted duplicate tubers and planted them in the Toluca Valley where the plants were given field resistance ratings.

Results from greenhouse screening for dominant-gene resistance, coupled with the Mexico field readings show that several selections have 3-4 dominant genes plus a field resistance reading of 2- 3+. Some selections bearing gene Rx also have field readings of 2. The tubers of the latter selections are not commercial and further backcrossing will be necessary before this new gene is incorporated in a commercial variety.

Studies on Multiple-Gene Resistance

Considerable difficulty has been encountered in assessing and selecting for field resistance in the greenhouse. This is not only true at this station but other investigators at other stations also have had difficulty. Some work has been started here in an effort to determine the nature of field resistance and to work out methods for selecting in the greenhouse. One experiment which has given results helpful to us in selecting for field resistance is reported below for the benefit of others.

Fourteen selections and varieties varying in field resistance from 3-5, as rated in Mexico in 1956 by Gallegly and Niederhauser, were selected for this experiment. Single eyes were removed from tubers and planted in vermiculite in 3" clay pots. The pots were then placed in shallow metal trays containing Hoagland's nutrient solution varying in concentration of 0.1, 1, and 3 times the basal strength. Eight plants of each variety were grown at each nutrient level for 30 days from the time of planting and then inoculated with a virulent culture of race 1,2,3,4 of *P. infestans*. This race was used to prevent the expression of resistance which one or more of the 4 dominant genes might give to the lower-order races.

The severity of disease development was rated on a scale of 0 through 5 (0 = no blight and 5 = plants dead) at 5, 7, 10 and 20 days after inoculation.

The index classes for the greenhouse and the Mexico field tests are as follows:

Greenhouse. 0 = no blight; 1 = leaf and stem lesions with small dark necrotic spots not spreading; 2 = leaf lesions larger but no large stem lesions; 3 = leaves beginning to collapse from coalescing lesions; stem lesions spreading but stem not shriveled, etc., 4 = leaves and stems collapsed from spread but plant not dead; 5 = plant dead.

Mexico Field Index. 0 = no lesions; 1 = a few lesions which may be atypical--one has to look for lesions; 2 = lesions more numerous and easily seen--about 25% of plant affected; 3 = about 50% of plant affected; 4 = about 75% of plant affected; 5 = plant dead.

The results from the 20-day readings are shown in the following table:

Selection or Variety	Mean disease index at nutrient concentration 0.1 H	1 H	3 H	Mexico field Reading
1 B3689-WV4	2.4	3.5	5.0	3
2 WV14-17	1.5	3.4	4.9	3
3 WV13-3	2.9	3.3	4.8	3+
4 WV2-7	1.5	2.8	5.0	3+
5 B3722-WV3	2.9	4.0	5.0	3+
7 B3718-WV13	2.6	4.5	5.0	4
8 B3720-WV4	2.3	4.1	5.0	4
6 WV2-4	2.6	3.8	4.9	4
9 B3722-WV8	3.4	4.9	5.0	4+
10 WV12-7	1.7	4.0	5.0	4+
11 WV16-10	2.6	4.4	5.0	4+
12 Cobbler	3.1	5.0	5.0	--
13 Bintje	3.4	5.0	5.0	5
14 WV13-5	3.5	5.0	5.0	5

The data in the table above show that when plants are grown at a high fertility level, multigenic field resistance is not expressed whereas at the very low fertility level, even known susceptible plants show resistance. However, at the 1H level, slightly below the optimum for growth according to height measurements, field resistance was expressed.

There was a slight correlation between the Mexico field ratings and greenhouse ratings at the 1H nutrient level. The plants with a 3 and 3+ reading in Mexico showed lower greenhouse ratings than did plants with Mexico field reading of 4 and 4+. The lack of complete correlation might suggest that more than one multiple-gene series is involved in field resistance.

The information above is presented here for the benefit of others who may be screening for field resistance and may help to explain why greenhouse tests usually fail to show individuals having field resistance. Normally, greenhouse soil is very fertile and possibly gives plants equal in susceptibility to those grown at the 3H nutrient level. Also, it is suggested that 10 plants, or more if possible, be used in each test for some variation in susceptibility was observed between individual plants within a variety at a given nutrient level. Also in each test, standard resistant and susceptible clones should be used for comparison.

The basic reason for differences in degree of field resistance is still not known. Analysis for soluble amino nitrogen of leaf tissue removed from the plants at the time of inoculation revealed no differences between selections grown at a given nutrient level. However, the amino nitrogen level in plants at the 3H level was twice that at the 0.1H level. It is possible that multigenic resistance is broken down at high fertility but it is more likely that the available nutrients inside the leaf are so favorable for growth of the fungus that resistance factors are overcome.

WEST VIRGINIA

K. C. Westover and J. R. Shumaker

The testing and selecting of varieties and seedling stocks for desirable horticultural characteristics was done at the Reedsville Experiment Farm (altitude 1,800 feet) by the Department of Horticulture. The breeding and screening program for disease resistance was carried on at Huttonsville, West Virginia, (altitude 2,000 feet) and in the pathological greenhouse in Morgantown by the Department of Plant Pathology. Insofar as possible only seedling stocks carrying resistance to late blight were included in our plantings this season. The planting stock used in all the plantings at the Reedsville Farm, instead of having been tuber indexed immediately before the planting season, came from an isolated planting (1957) which was frequently and intensively rogued until it was killed early in the fall to avoid probable heavy late-season disease contamination. During this current growing season two isolated plantings--one at the Reedsville Farm and the other in Canaan Valley (altitude 3,250 feet) each containing all the selections used in our trial plantings--were made. Two harvests were made, the first early in the season when the tubers were set-size to perpetrate the selections and the second in the early fall to provide planting material for next season's trials. At harvest two 10-tuber samples from the row plantings and a single sample from the ten-hill unit planting were taken for specific gravity determinations.

Growing conditions in this area were in general unfavorable. A late planting season followed by continuous wet weather from the time the early varieties were in bud until harvest time hindered efficient cultural and pest control operations which resulted in low yields of No. 1's and a large proportion of small tubers.

All the plantings at the Reedsville Farm were on deep, well-drained shale or silty loams in good tilth. Heavy clover sod was turned under immediately before, and a 1500-pound application of 5-10-10 commercial fertilizer was applied bandwise at planting time. The rows of all the plantings were 36 inches apart and the distance between sets in the row plantings was 10 inches. The single-row plots were 40 feet long. Planting was done by machine.

Family Line Planting. About 2400 tubers from 31 family lines were spaced 40 inches apart in the row. Eight family lines came from Beltsville and the remaining 23 originated at this station. The seventy-eight selections made will be planted in 10-hill units in 1959.

Ten-Hill Unit Planting. One-hundred and ten units were planted. For comparative purposes check units of Cobblers and Sebagos occurred alternately every third unit in the row and were staggered in the rows across the planting so that each seedling unit was abutted and flanked by at least one of the check units and was not more than a row removed from the other. The thirty-three selections made will be planted in the 40-foot row trials this coming season.

40-Foot Row Planting. Forty-one selections--seedlings and few new varieties--were included in this planting. A single row of each was planted. Check rows of Cobblers and Sebagos alternated every third row so that each selection on trial was flanked by one of the check varieties and was only a row removed from the other. Data on the selections from this planting are summarized in West Virginia Table I.

W. Va. Table 1. Yields and disease resistance information of selections from 40'-row plantings, Reedsville Experiment Farm, 1958.

Variety	Parentage	U. S. No. 1's Cwts.	Total Yield Cwts.	Off Grade Pct.	Resistant to
B 3715-4 W.Va.	Ac25953 x 3ZU-5	348	408	14.9	$LB_{1,3}$
B 3739-3 W.Va.	3 NC-9 x Ac25953	303	401	24.3	$LB_{1,3}$
B 3754-5 W.Va.	3XE-1 x Ac25949	281	369	24.0	$LB_{1,3}$
B 3748-6 W.Va.	3YW-9 x B 3160-12	270	393	31.2	$LB_{1,2}$
B 3684-12 W.Va.	X927-3 x Ac25953	230	272	15.5	LB_{3}
B 3710-3 W.Va.	Ac25953 x B 96-56	212	276	23.1	$LB_{1,3}$
B 3722-7 W.Va.	Ac25953 x B 3167-28	191	295	35.5	$LB_{1,3}$
LA 1354 (s)	Pontiac x 92-36-5	179	201	11.0	
B 3718-4 W.Va.	Ac25933 x B 2131-3	167	250	33.1	$LB_{1,3}$
I 1305-3 W.Va.	I 872-4 x B 3013-3	154	170	9.6	LB_{1},X
I 961-1 (s)	44-8-4 x B 96-56	131	178	26.0	S, VW
I 1305-8 W.Va.	I 872-4 x B 3013-3	122	152	19.8	S, LB_{1},X
I 1324-8 W.Va.	B 595-76 x Osage	112	144	22.2	S, LB_{1},X, VW
I 1333-2 W.Va.	X 927-3 x I 1077-13	95	171	44.3	S, LB_{1}, LR
I 781-7 (s)	Osage x 45-10-3	93	150	38.2	S
TAWA	B 595-76 x B 76-23	83	127	34.6	S, LB_{1}, X,A
Cobbler	(av. of 12 checks)	133	173	23.3	
Sebago	(av. of 11 checks)	201	236	14.6	

(1) LB = Late blight ($LB_{1,2}$, etc. = contains resistance gene R_1, R_2, etc.), S = scab, X = virus, X,A = Virus A, LR = Leaf Roll, VW = Verticillum Wilt.

(2) Off grade based on total yields.

Replicated Planting. This planting consisted of thirteen seedling stocks surviving several years' selection and eight named varieties, some of which were on trial--the remaining being established varieties in the State. The planting comprised four replications of a 40-foot, single-row plot of each of the seedstocks in an imcomplete block (lattice) arrangement. 1/ West Virginia table 2 summarizes the data from this planting.

1/ Gertrude M. Cox and Robert C. Eskhardt. The Analysis of Lattice and Triple Lattice Experiments in Corn Varietal Tests. Iowa Agr. Exp. Sta. Res. Bul. 281. 1940.

W. Va. Table 2. Yields and disease resistance information from replicated trials. Reedsville Experiment Farm, 1958.

Variety	Parentage	U. S. No. 1's	Total Yield	Off Grade	Resistant to
		Cwts.	Cwts.	Pct.	
Pontiac		206	270	23.7	
Boone		167	211	21.2	LB_1
I 8140-ILa	45-11-26 x B 67-11	164	202	18.8	S
B 69-16	Katahdin x B 96x56	155	186	16.5	LB_1
B 313-21	Sequoia x B 96x56	154	202	24.0	LB_1
Cobbler		153	239	36.1	W
Sebago		153	221	30.8	LB, S, A, YD
Katahdin		141	209	32.7	A, Y, D
I 1058-2 W.Va.	B 962-32 x B 762-46	126	185	32.0	LB_1, RR
B 3739-2 W.Va.	3NC-9 x Ac25953	122	253	52.0	$LB_{2,3}$
B 3721-3 W.Va.	Ac25953 x B 3160-12	120	199	40.0	$LB_{2,3}$
Delus		116	160	26.8	LB_1
I 8168-1	6316 x B 766-88	114	211	45.9	
B2858-5 W.Va.	B381-2 x Katahdin	113	157	28.5	LB_1, A
Houma		109	192	43.4	A, NN, D
Merrimack		93	181	48.8	LB_1, RR, A, NN
B 3409-4 W.Va.	Kennebec x Katahdin	89	181	51.0	LB_1, RR
Chippewa		84	161	47.5	A
B 2924-8 W.Va.	B 608-56 x B 594-46	84	168	50.0	LB_1
Russet Cherokee		78	151	48.6	
I 1082-2 W.Va.	N225.43 x B 61-3	75	215	65.3	LB_1, S
Kennebec		67	158	57.2	LB_1, NN
B 1089-2 W.Va.	B 63-16 x Teton	54	160	66.3	LB_1, RR
Plymouth		52	176	70.5	LB_1, S
I 933-3 W.Va.	B 607-72 x M113.43	49	144	66.1	LB_1
L.S.D. 5%		37			
L.S.D. 1%		50			

(1) LB = Late Blight (LB_1, etc. contains resistance genes $R_{1,2}$, etc.), S = scab, W = wart disease, YD = yellow dwarf, A = virus, A,Y = virus Y, D = drought, RR = ring rot, NN = net necrosis, LR = leaf roll.

(2) Off grade based on total yields.

WISCONSIN

G. H. Rieman, D. C. Cooper, and R. H. Larson

Cooperating Agencies and Principal Leaders: University of Wisconsin, Departments of Genetics and Plant Pathology; Horticultural Crops Research Branch, Vegetable Crops Section, USDA.

Combining Ability: The Wisconsin Station has continued studies on the improvement of procedures and methods for obtaining parental clones possessing favorable frequencies of genes conditioning immunity to virus X and resistance to scab and other horticultural characters. The combining abilities of selected pollen-fertile clones, resulting from selfing and sib-mating, are being studied in progeny tests. A total of 1,274 five-hill and ten-hill clones are being evaluated in a series of selfs, sib-matings and out crosses to unrelated lines.

Pollen Irradiation: Pollen inactivation studies were made with gamma-ray irradiation in an attempt to induce diploids. Three dosage levels were used -- 1,000 r, 10,000 r, and 20,000 r. Pollen inactivation appeared to occur between 10,000 r and 20,000 r. Seedlings resulting from pollinations with treated pollen are being examined for the diploid condition.

Diploid Solanum Tuberosum: Four diploids of the common potato were obtained by examining the stomatal size and number from mature leaves in normal seedling populations. The average number of stomata per unit area was fairly constant (180 - 190 in 25 areas) and the mean size of the stomata was 38μ x 27μ in the tetraploid controls. In four instances the number of stomata was twice that usually present (360 - 375 in 25 areas) and the mean size was 29μ x 23μ. The plants with the larger number of small stomata all proved to be diploids. Homozygosity in tetraploid is very difficult to attain yet greater concentration of numerous desirable genes in parental clones is essential for future progress in potato improvement. Tetraploids possessing favorable gene frequencies are valuable in potato breeding in two ways: (1) their direct use as parental clones in the development of new varieties; (2) their use in the development of diploids (gametic sampling) and further purification at a less complex ploidy level. This report indicates that diploids occur in normal tetraploid seedling populations. Breeders may select such individuals from their materials for the purpose of establishing parental clones at the advantageous diploid level. The isolation of diploids from the best tetraploid parental clones presently available will continue to receive major attention. Cytological verification will be made on 31 new seedlings which appear to be diploids on the basis of number and size of stomata. Combining ability studies will be continued with tetraploid stocks possessing genes governing immunity to virus X, resistance to scab and other horticultural characters.

WISCONSIN
F. J. Stevenson and Charles E. Cunningham

Red Dot Potato-Research Program

The Red Dot Potato-Research Program includes genetics, breeding, fertilizer tests and weed eradication. The potato genetics program is designed to study the breeding behavior of chip quality and its relation to sugar content and specific gravity of the tubers after cold storage and reconditioning. The breeding program is designed to select for superior chip quality and combine this very complex character with, season of maturity, yield, percentage of solids, tuber shape, shallow eyes, keeping quality, and resistance to the most troublesome diseases. The fertilizer tests are planned to study the reactions of varieties to various applications of chemical compounds, with respect to rate and time of application and the interactions of the various factors involved. Weed eradication tests include the application of herbicides and other cultural practices.

Genetics

Chip quality is not a single genetic character but the result of the inter-relationships of a number of characters of the tuber such as sugar content, specific gravity, reaction to storage temperatures, reconditioning capability after storage, and many others. Each of these characters is the end result of the interactions of an unknown number of genes and numerous environmental factors.

Most of the reports in the literature on chip quality and related characters are based on results obtained from very few samples of relatively few varieties grown and handled under widely divergent conditions. The conclusions from such tests often seem contradictory and are sometimes misleading.

In 1958 a number of crosses and selfed lines were grown in the field on the Red Dot Research Farm, Rhinelander. Tuber samples of each seedling, of each parent and of Kennebec checks are stored at 42°F. at Madison. These samples will be held at that temperature for about three months after which they will be reconditioned at 70° to 75° for approximately four weeks. Data on specific gravity, sugar content, and chip color will be obtained and all possible relationships determined.

The parents of the crosses and selfed lines were selected previously because of their diversity of reactions to a storage temperature of 38° and a reconditioning period at 70° - 75°.

Techniques and Results

Since, as far as the authors of this report are aware, no one has made an attempt to study the inheritance of chip quality, and since thousands of seedlings must be tested for the various characters involved it is essential to find techniques that will save labor and time.

In 1956 a semi-quantitative test was used to measure reducing sugars, mostly glucose, in potato tubers. The method was used on 870 seedlings representing 31 family lines grown in $2\frac{1}{2}$-inch pots in the greenhouse at Madison. In 1957, these seedlings were given individual numbers and planted in the field on the Red Dot Research Farm, Rhinelander, Wisconsin. These plants were harvested individually. The tubers were tested for sugar content and fried to determine their chip color. The correlation between the sugar content of the 870 seedlings grown in pots in the greenhouse in 1956 and the identical seedlings grown in single hills in 1957 was .074. Such a correlation would indicate that in these trials, the sugar test of greenhouse seedlings was of no value in predicting the sugar content of field-grown seedling varieties. The sugar content of the greenhouse seedlings was consistently lower than that of the field-grown seedlings. Twenty-three percent of the 870 seedlings grown in the greenhouse showed no sugar and none of them showed as high as 2 percent. In contrast to this, none of the field-grown seedlings was free from sugar and nearly a third of them showed 2 percent or more sugar.

Only a small percentage of chips met commercial requirements so far as chip color was concerned, but it was interesting to note that chips with satisfactory color were made from some of the seedlings of 30 out of 31 family lines.

The correlation coefficient between sugar content and chip color was -.38. The correlation was highly significant from the statistical standpoint but was too low to be of much value in a plant breeding program. A correlation of -.38 indicates that low sugar and high chip color occurred together about 14 percent of the time. This shows that sugar tests were of little value in predicting chip color so far as the 31 segregating family lines were concerned.

Solids and Chip Color as Affected by Clonal Generation

The percentages of solids in the first and second clonal generations were about the same in each generation but the results for chip color were quite unlike. The average chip color of more than 600 seedlings was 67 in the first clonal generation but 74 in the second clonal generation.

The correlation coefficients between percentage solids and chip color for 600 seedlings representing 9 family lines were .45 and .42 for the first and second clonal generations respectively. The average correlation coefficient for the 9 progenies in 2 generations was .44. With such a correlation, a high percentage of solids and high chip color occurred together about 20 percent of the time.

The data so far secured indicates that tests for chip color should be made in the second and later clonal generations. Sugar determinations and specific gravity tests of the tubers are of little use in predicting chip color in a breeding program.

Our results, for the present, indicate that the only sure way to test chip quality, is to cook and evaluate the chips.

Seed

In 1958 nearly 200 crosses and selfs were made in the greenhouse at Madison. The conditions were very favorable for seed setting. The seed of each combination was threshed, dried, and measured in a graduated cylinder. The number of seeds in 5cc were counted and the average number per cc used to estimate the number of seeds in the measured lots. It was calculated that more than 180,000 seeds were produced.

New Seedlings

About 26,400 seedlings representing 166 family lines were planted in the field on the Red Dot Research Farm, Rhinelander. About 5,000 of these were planted to study the genetics of chip quality, selections from the other 21,400 will be tested for chip quality, yield, time of maturity, shape, fertility, and disease resistance.

The sources from which these seedlings were secured, the number of progenies, seedlings grown, selections made and the percentage of seedlings selected are given in Stevenson table 1.

Stevenson table 1. Summary of seedling varieties first year in field. Red Dot Research Farm, Rhinelander, Wisconsin, 1958.

Original Source	Progenies	Seedlings grown	Selections Made	Selections Made
	No.	No.	No.	Pct.
Red Dot Greenhouse	58	8,838	1,181	13.4
Beltsville, Maryland 1/	39	7,473	413	5.5
Fargo, North Dakota 2/	14	2,982	202	6.8
Fargo, North Dakota 3/	18	1,076	183	17.0
Canada 4/	14	1,034	53	5.1
Total	142	21,403	2,032	9.5

1/ From Robert V. Akeley
2/ From William Hoyman (now stationed at Prosser, Washington)
3/ From Robert Johansen
4/ From Donald Young, Fredericton, N. B.

Seedling Varieties Second Year in Field

In 1958, 1,630 seedling varieties were grown in 10- or multiple 10-hill rows. Four-hundred sixty five or 29 percent of these were selected. Tubers of these are now in 42° storage. The first of the year they will be removed from storage, reconditioned and tested for percentage solids and chip color. In 1959 those giving the highest chip quality will be tested for yield and other characters. Earliness is given a high priority in our program. For this reason it is interesting to note that 77 percent of the second year seedling varieties were early or medium early in maturity. (Stevenson table 2.)

Stevenson table 2. Summary of seedling varieties second year in field. Red Dot Research Farm, Rhinelander, Wisconsin, 1958.

Original Source	Progenies	Seedlings Grown	Selections Made	Selections Made	Early or Med.-Early	
	No.	No.	No.	Pct.	No.	Pct.
Red Dot Greenhouse	56	972	303	31	720	74
Beltsville, Maryland	28	258	48	19	218	84
Fargo, North Dakota 1/	14	97	19	20	62	64
Fargo, North Dakota 2/	25	219	86	39	192	88
Aberdeen, Idaho	12	24	1	4	10	42
Canada	7	60	8	13	48	80
Total	142	1,630	465	29	1,250	77

1/ From William Hoyman now stationed at Prosser, Washington

2/ From Robert Johansen

Early Varietal Test

In 1958, 25 named and numbered varieties were grown on the Red Dot Research Farm to be tested for yield, earliness, solids, chip color and other characters.

Each variety was planted in six randomized blocks, twenty hills per replicate, plants one foot apart in the row with the rows three feet apart. Fertilizer was applied at the rate of 1,000 pounds of 5-20-20 per acre and a side dressing of 170 pounds of ammonium nitrate. The plots were planted May 5, and harvested August 20. The check variety Early Ohio yielded at the rate of 148 sacks per acre of potatoes over two inches in diameter. It was outyielded significantly by 11 varieties. Only one variety out of the 25 tested was significantly lower in yield than Early Ohio.

Samples of tubers from all plots were shipped to Madison and chipped the week following harvest. The color of the chips made from any one of the 25 varieties would be considered excellent from the commercial standpoint. Other samples were held in warm storage for about 6 weeks and chipped. The chips made from the latter samples were on the average a few points darker in color but were all good from the commercial standpoint.

It is evident that it is not difficult to produce varieties that make high quality chips if grown properly, handled carefully and cooked before cold storage.

Late Varietal Trial

In 1958, twenty-nine named and numbered varieties were planted on the Research Farm on May 5 and harvested September 15. The design and the fertilizer applications were the same as those reported for the early varietal test.

Duplicate samples of all replicates were shipped to Madison. One is stored at 50° the other at 42°. Chip color, percentage solids and keeping quality will be studied on all samples. The results of these tests are not available for this report.

Varietal Tests in Alabama

In 1958, 29 varieties were tested for yield, earliness and other characters in Alabama and samples of tubers sent to Madison to be tested for chip quality. The plots were planted February 3, and harvested May 26.

Early Ohio was planted as an early check variety and Russet Sebago as a late check. Seven varieties were earlier than Early Ohio and 13 others were distinctly earlier than Russet Sebago.

The yields on these plots were excellent, Early Ohio yielded 235 sacks per acre and Russet Sebago 311. Fifteen varieties were significantly higher in yield than Early Ohio but none was higher than Russet Sebago. However, 3 seedling varieties were in the same yield class as Russet Sebago. These 3 seedlings were earlier than Russet Sebago and would no doubt have outyielded the standard variety if the harvesting had been done three weeks earlier.

Twenty-four varieties produced potatoes of good type, smooth and shallow eyed.

The tubers of 3 varieties were higher in percentage solids than Russet Sebago, 18 were in the same class, and the other 7 were lower in percentage solids than Russet Sebago.

Chips with a color score of 80 are considered satisfactory from the commercial standpoint. On this basis satisfactory chips were made from all 29 varieties. However, chips made from some varieties were much lighter in color than those made from other varieties. The chips from 3 varieties averaged 90 in color. The chips from 19 others scored from 85 to 89 and 5 others from 81 to 84.

It is evident that it is not difficult to produce varieties with high chip quality when the potatoes are grown properly in Alabama and fried soon after harvest.

In addition to the varieties grown in the yield tests 107 seedling varieties were planted in 5-hill rows for observation in Alabama.

The tubers of these varieties ranged in percentage solids from 13.9 to 20.3. The average for the 107 was 17.0 percent. The average for Russet Sebago grown in a yield test in much the same location as the observation plots, was 17.6 percent solids. Thirty-one of the seedling varieties were higher in percentage solids than Russet Sebago.

The chip color of the 107 varieties ranged from 75 to 90. Seventy-one ranged from 85 to 90. The average chip color for all 107 varieties was 85.

Maturity notes were taken on May 7. About 50 percent of the selections scored early or extra early, 45 were rated medium early and 5 were as late as Russet Sebago.

Several of the earlies or extra earlies were deficient in yield; others showed better than average yielding ability. Some of the best of the latter will be included in the 1959 yield tests.

Verticillium Wilt Tests

In the winter of 1958, 703 seedling varieties representing 48 family lines were tested for their reactions to verticillium wilt in the greenhouse at Madison.

One or both of the parents of these family lines previously showed various degrees of resistance to this disease.

From a total of the 703 varieties tested 65 showed no infection, 38 showed a degree of infection but the plants were not killed. The plants of the other 600 were killed or nearly killed. Some of the 600 varieties succumbed to the disease in a much shorter time than others. Kennebec was intermediate in this respect. 792-88 the resistant check became infected but the plants showed a high degree of resistance or tolerance.

In the summer of 1958 most of the seedling varieties were tested for their reactions to verticillium wilt in the field at Rhinelander. The results in the field were very similar to those found in the greenhouse.

In addition to the above tests about 3,600 seedlings representing 30 family lines were grown from true seed and screened for their reactions to verticillium wilt. One or both of the parents of these family lines were resistant to wilt in previous tests. Most of the seedlings were killed by wilt. The seedlings that did not show infection were potted. Some of the potted plants grew large vines but produced no tubers. Of the seedlings that did produce tubers 130 were saved for planting at Rhinelander in 1959.

WYOMING

W. A. Riedl, J. R. Vaughn, and C. W. McAnelly

The potato breeding work in Wyoming in 1958 consisted primarily of breeding for red skin varieties, resistant to scab, with high yield of desirable type tubers.

Twenty-two seedling families were grown. Several promising selections were made for further testing. Two-hundred and fifty selections were grown in 4-hill units for observation. The best of these have been saved for further study. Eighty selections were grown in a 25-hill-row yield trial. Eighteen promising seedlings were grown in a yield trial at Laramie. The trial consisted of one-row plots 40 feet long with 4 replications. Another yield trial, similar to the above, contained 18 varieties. In addition, 18 varieties and promising seedlings were grown in a similar yield trial at the Torrington Substation.

The total yield and the yield of U. S. No. ones (over 2-inch screen) were obtained. The percent of U. S. No. ones and percent of dry matter were also determined. The results of the three yield trials are given in tables 1, 2, and 3. Nine promising seedlings were increased at Laramie, and three were increased at the Torrington Substation.

The scab nursery test was again conducted at Laramie in 1958. The results are presented in Wyoming table 4.

Wyoming table 1. Potato Variety Yield Trial, Laramie, Wyoming, 1958.

Variety	Yield per acre Total	U. S. No. 1	Rank of U. S. No. 1's	U. S. No.1's	Rank of Pct. U.S. No. 1's	Total Solids	Stand
	Bu.	Bu.		Pct.		Pct.	Pct.
Red Pontiac	389	293*	6	75	12	19.7	94
Desota	386*	328	1	85	7	19.3	95
Kennebec	375*	303*	3	81	8	21.2	96
LaSoda	372*	292*	7	78	10	20.1	86
Redglo	355*	304*	2	86	5	18.0	84
Irish Cobbler	346*	300*	5	87	3	20.3	99
Sheridan	346*	301*	4	87	3	19.5	86
Red Bliss Triumph	316*	247	9	78	10	19.5	88
Progress	313*	216	12	69	16	19.3	91
Cayuga	287	207	13	72	14	22.5	100
Satapa	275	207	13	75	12	18.2	64
Redbake	275	248	8	90	1	21.0	76
Yampa	257	227	10	88	2	21.6	81
Teton	256	221	11	86	5	20.8	81
Russet Burbank	230	168	16	73	15	20.5	84
Red McClure	218	174	15	80	9	20.1	86
Early Gem	213	136	17	64	17	18.2	85
General Mean	307	245		80		20.0	87
L.S.D. (5% Level)	78	69					

Wyoming table 1. (Continued)

* Statistically equal to highest yield at the 5% level. Previous crop, Alfalfa; planted, May 28; One-row plots 40-feet long, with 4 replications; rows spaced 3 feet apart with hills spaced 1 foot apart in the row; dusted with sulphur and 5% DDT on July 14 and July 29; irrigated June 23, July 21, August 7 and 19; and harvested September 29.

Wyoming table 2. Potato Seedling Yield Trial, Laramie, Wyoming, 1958.

Variety or Seedling	Yield per acre Total	Yield per acre U. S. No. 1	Rank U. S. No.1's	U. S. No.1's	Rank of Pct. U.S. No. 1's	Total Solids	Stand
	Bu.	Bu.		Pct.	Pct.	Pct.	Pct.
W 2753	384	334	1	85	6	20.3	64
W 2578	331	287*	2	87	3	20.3	79
W 2650	330	278	3	84	9	19.0	86
Bliss Triumph	325	239	6	74	17	19.5	99
W 2662	304	257	4	85	6	----	94
W 2550	298	254	5	85	6	20.5	80
W 2541	263	203	8	77	14	----	76
W 2542	245	206	7	84	9	19.5	89
W 2548	241	192	10	80	13	19.9	73
W U29	230	200	9	87	3	21.0	79
W 2687	222	180	12	81	12	20.1	84
W 2722	222	162	16	73	18	22.3	86
W U15	216	166	15	77	14	19.5	94
W 2549 L.V.	216	186	11	86	5	19.0	64
W 1122	189	171	13	90	2	19.0	53
W 2598	186	153	16	82	11	19.3	57
W 2549 S.V.	183	138	18	75	16	20.1	64
W 2556	159	148	17	93	1	----	52
General Mean	253	209		83		20.0	76
L.S.D. (5% point)	51	48					

* See footnote in Wyoming table 1.

Wyoming table 3. Potato variety yield trial, Torrington Substation, 1958.

Variety or Seedling	Yield per acre Total	Yield per acre U. S. No. 1	Rank of U. S. No.1's	U. S. No.1's	Rank of Pct. U.S. No. 1's	Total Solids	Stand
	Bu.	Bu.		Pct.	Pct.	Pct.	Pct.
Irish Cobbler	706	536*	2	76	11	20.3	77
LaSoda	692*	567	1	82	4	17.8	78
Redglo	633*	483	3	76	11	16.8	77
Bliss Triumph	588	450	6	77	8	19.9	68
Red Pontiac	585	448	7	77	8	16.9	75
W 2578	580	474	4	82	4	20.3	85
Sheridan	571	464	5	81	6	19.3	65
W U15	557	375	13	67	15	19.5	60
Teton	545	417	9	77	8	18.4	73
Cayuga	529	380	12	72	14	20.5	84
Progress	528	351	14	66	17	18.8	56
Redbake	523	438	8	84	1	19.9	54
Kennebec	521	388	11	74	13	21.0	58
W 2722	510	341	15	67	15	20.5	79
W 2548	493	408	10	83	2	19.5	65
W 2598	393	313	16	80	7	18.6	58
W 2687	232	133	18	57	18	20.1	60
W U29	232	192	17	83	2	21.0	29
General Mean	523	398		75		19.4	68
L.S.D. (5% Level)	96	67					

* Statistically equal to highest yield at the 5% level. Previous crop, alfalfa; planted, June 3; one-row plots 35 feet long, with 4 replications; rows spaced 3 feet apart and hills spaced 1 foot apart; and harvested October 6.

Wyoming table 4. Scab nursery test, Laramie, 1958.

	Selection	Replication 1 Type Scab	Replication 1 Area Covered Pct.	Replication 2 Type Scab	Replication 2 Area Covered Pct.
	B 3114-67	1	Trace	0	0
	B 3457-2	0	0	0	0
	B 4075	2	Trace	1	Trace
	B 4087-5	1	Trace	0	0
	B 4090-1	1	Trace	1	Trace
	B 4090-5	1	Trace	2	2
	B 4093-2	2	Trace	0	0
	B 4093-7	0	0	0	0
	B 4093-14	0	0	0	0
	B 4093-15	1	Trace	0	0
	B 4094-9	0	0	1	2
	B 4105-2	2	Trace	2	Trace
	B 4116-5	2	2	2	1
	B 4119-1	2	1	2	Trace
	B 4120-2	0	0	1	Trace
	B 4128-14	2	Trace		
	B 4130-7	2	Trace	1	Trace
	B 4130-11	1	Trace	1	Trace
	B 4132-14	2	Trace	1	Trace
	B 4132-23	2	1	2	Trace
	B 4132-25	1	Trace	1	Trace
	B 4134-24	2	Trace	3	1
	B 4134-34	3	Trace	3	2
	B 4135-2	2	1	2	Trace
	B 4158-5	1	Trace	2	2
	B 4170-3	0	0	1	Trace
	B 4207-1			1	Trace
Check	Bliss Triumph	2	2	3	4
"	" "	3	5	3	2
"	" "				
"	" "	2	3	3	3

All but check plots were marketable.

BRAZIL

Horticultural Experimental Station
Domingos Petrolini, Rio Grande do Sul
F. F. Guimaraes and Ney Kremer Luz

Resistance to *Pseudomonas solanacearum*

The varieties and seedlings listed in Brazil table 1. were tested in 1957. They showed less than 10 percent infection and were retested in 1958. The readings of B929-23, A806-1, and X639-5 were based on a small number of plants in the field test.

Three inoculation tests were conducted in the laboratory and are also presented in Brazil table 1. The method used here consisted of cutting along one side of the plant roots and then pouring a bacterial suspension onto the soil of the potted plants.

At present 64 seedlings and varieties have never shown any signs of brown rot when grown under field conditions. Some of these selections have been submitted to an inoculation test in the laboratory and have high resistance to brown rot as indicated by a relatively high index rating.

Resistance to Late Blight

Breeding for late blight resistance is conducted in cooperation with Mr. Ney Kremer Luz and Mr. C. A. R. Nova Cruz (pathologists) at the Experimental Station. Three more races were identified in 1958 making a total of 7 known races as follows: 0; 1; 3; 4; 1,4; 2,3; 3,4. At present we have 20 accessions and 25 seedlings that have not shown any signs of late blight when grown in the field. Forty-four seedlings and 3 accessions are very resistant to the 7 known blight races that occurred here and are also good yielders.

Pantucha, a cross between Panther and Gaúcha made in 1948, is resistant to the "0" race of the late blight fungus and has light yellow flesh. Panther is a German variety and Gaúcha is a selfing from Starkeragis. It is doing very well in the Netherlands according to Dr. J. A. Hogen, Director of I.V.R.O., Holland and will be tested in 3 different areas in 1959.

Brazil table 1. Resistance to Pseudomonas solanacearum (Brown rot)

Variety	Field Test 1957	Field Test 1958	Laboratory Test 1958 (3 tests)1/
	Pct.	Pct.	Index
Ac. 25982	4.0	2.2	57
Ac. 25920	4.0	4.2	66
Aquila No. 5	8.0	4.9	44
B 929-23	8.0	0.0 2/	75
B 2969-15	0.0	4.6	76
B 3559-1	0.0	7.5	100
Frühnudel	8.0	9.2	36 3/
A 806-1	2.0	6.7	100
X 598-4	9.0	8.5	39
X 635-2	3.0	9.1	70
X 639-5	8.0	0.0 2/	100
Pantucha (check)			100

1/ Winstead and Kelman tables (Phytopathology 42(11): 628-634, 1952).

2/ Records obtained from reduced number of plants.

3/ Records obtained from only 1 test.

CANADA (ONTARIO)

G.R. Johnston, R.G. Rowberry, and N.M. Parks*

Potato variety and seedling trials are conducted co-operatively in the Province of Ontario by the Field Husbandry Department, Ontario Agricultural College, Guelph, and the Horticulture Division, Experimental Farms Service, Ottawa. Adaptation trials are conducted at the Potato Experiment Station near Guelph and the more promising potato seedlings and varieties are tested regionally in Ontario in ten of the major potato-producing areas of the province. Four of these trials are located in northern Ontario and six in the southern part.

At the Potato Experimental Farm at Guelph, weather conditions were not too favorable during the early part of the growing season in 1958. May and June were abnormally cool and dry with a moderately severe ground frost in mid-June that did extensive damage to emerged potato plants. A four-inch deficit in rainfall during the period of July 7 to August 20 was compensated for by sprinkler-type irrigation from a deep-well installation. Temperatures during the July to September period were near normal. The yields of the regional trials located in Simcoe and Dufferin Counties were noticeably affected by the July-August drought as irrigation facilities were not available. On the other hand, the trial at Temiskaming in Northern Ontario suffered from excessive rainfall in June and July.

At the Guelph Potato Experimental Station all trials were fertilized at time of planting with 6-12-12 at 1200 pounds per acre. The regional trials were fertilized at the rates and analyses recommended for their particular soil and region. In the latter, the rates varied from 1000 to 1500 pounds per acre. In all trials the spacings were 36 inches between rows and 10 inches in the row. All seed was hand cut from "A" size tubers. At the Guelph station a weekly spray program was carried out using 25% D.D.T. emulsion and zineb. Malathion was used to control aphids in August and September.

Ontario table 1 presents the data on the U.S. introduced potato seedlings and varieties grown in non-replicated adaptation trial at the Guelph station in 1958. Yields were not determined in bushels per acre for the trial. Entries were either retained (R) for retrial in 1959 or discarded (D) based on their performance under local conditions.

Sixteen of the more advanced Canadian potato seedlings and nine of the U.S. introduced seedlings or varieties were included in a yield trial (three replications; 30-ft. plots) at the Guelph station. These were compared to

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the check varieties Irish Cobbler and Katahdin. The data of maturity, yield, total solids and cooking quality are presented in Ontario table 2. Several of the entries exceeded both Irish Cobbler and Katahdin in total solids content and a few exceeded Katahdin in yielding ability. Sufficient seed is on hand to advance the following to the All-Ontario (Regional) trials in 1959: Norland, Haig, Red Beauty, G 2500-8 and G 2966-1. Several of the others will be increased in 1959 and further evaluated in replicated Adaptation trial at Guelph. The following have potential value in the processing field due to their high solids content: G 2505-2, G 2803-1, G 2645-6, and G 2805-5. The seed supply of these is very limited at present. G 2966-1 is a round, smooth russet with high scab resistance and good cooking quality. However, it has exhibited a tendency to growth cracks under some conditions. In cooking quality determinations, where the potatoes are boiled and rated by a panel of three experienced judges, a score of 5 or under is considered to be unsatisfactory from the standpoint of consumer acceptance.

Sixteen varieties or seedlings were included in the Ontario Regional Potato Variety Trial at ten locations. Three of these were check varieties - Irish Cobbler, Katahdin, and Sebago. All plots were 30 feet long, 10 inch spacings between sets, 36 inches between rows, with four replications. These trials were mainly on sandy-textured soils with the following exceptions: Dufferin - silt loam; Bradford - muck; Mindemoya (Manitoulin Island) - loam; Kapuskasing - clay loam. Ontario tables 3 to 5 present the yields in hundredweights, the total solids contents in percent and the rating of the cooking quality including a consumer preference index. Fundy and Avon were licensed in Canada in 1958. Fundy matures and yields with Irish Cobbler in most locations in Ontario and is equal to the latter in total solids and cooking quality. Fundy has the advantage of smooth tuber shape and shallow eyes but the skin is inclined to be flaked or slightly russetted when grown on coarse sandy soils. Norgleam is the earliest variety in the trial. It has smooth tuber shape but is susceptible to scab. Although lower in yield and total solids than Irish Cobbler, Norgleam has exhibited very good cooking and storing quality and has been very free of after-cooking discoloration. F 5080 is high in solids, smooth in tuber shape, resistant to scab but low in yielding ability. F 4932 has good tuber type, smooth white skin, and above-average yielding ability and solids content. It is resistant to the common race of late blight and moderately resistant to scab, especially the superficial scurfy type. Delus continues to exhibit superior solids content as well as excellent cooking and chipping quality but tends to be rough if oversize occurs and quite susceptible to scab. Avon was released in the Province of Nova Scotia as a chipping variety but has been somewhat rough in tuber type in Ontario with medium-deep eyes and only average cooking quality. Sebago is the leading variety in Canada and is becoming very popular in Ontario because of good yield and excellent cooking and chipping quality. It is, however, very late as is Boone and G 2505-37. The latter has good yield, excellent tuber type and high solids content but is late in maturity. G 2505-37 is resistant to the common race of late blight and moderately resistant to scab. In 1959 the following varieties will be retested in the Ontario regional trial: Norgleam, F 5080, F 5631, F 4932, Delus, and G 2505-37.

Sincere appreciation is extended to the U.S.D.A. and the State Experiment Stations for their kindness in making available their promising potato seedlings and varieties for inclusion in the Canadian potato testing program. We hope that the data presented is of some interest to our American co-workers.

Ontario table 1. Adaptation trial of potato seedlings and varieties introduced from The United States and grown at the Guelph Potato Experiment Station in 1958.

Variety or Seedling	Years Tested	Maturity	Tuber Disease Ratings				Total Solids Pct.	Disposition D or R
			Scab	L.B.	Rhiz.	S.Scurf		
			Iowa					
I 803-1	2	E	2	0	0	2	18.5	R
I 961-1	2	ME	2	0	0	3	18.5	R
I 1092-2	2	M	2	0	2	3	20.4	R
I 1111-10	2	ML	2	0	0	3	20.6	R
I 8140-1	2	ML	0	0	0	3	20.8	R
I 801-10	2	L	2	0	0	4	21.9	R
			Louisiana					
La 91-143	2	ME	2	0	0	2	19.4	D
			Michigan					
Ia 1037-1	2	E	3	0	0	2	19.6	D
Ia 1111-20	2	ME	2	0	0	3	20.0	R
Ia 1106-5	2	M	2	0	0	2	20.2	R
Ia 1109-9	2	M	2	0	0	4	20.2	R
Ia 1111-5	2	ML	2	0	0	3	20.4	R
Ia 1111-8	2	ML	2	0	0	4	20.6	R
R 139-9	2	E	3	0	0	5	18.3	D
R 123-9	2	L	2	0	0	2	18.3	R
			Minnesota					
Minn.12	2	VE	2	2	0	6	18.1	D
Minn.355	2	VE	2	0	0	5	20.0	D
Minn.11	2	ME	2	0	0	7	19.6	D
Minn.20	2	ME	2	0	0	6	20.4	R
			Nebraska					
Neb.76.50-3	2	E	3	0	1	6	17.9	D
Neb.77.44-1	2	E	2	0	1	6	17.9	R
Neb.83.49-1	2	E	3	2	0	4	19.8	R
Neb.29.47-2	2	ML	3	0	0	4	18.3	D
Neb.41.49-4	2	ML	4	0	0	3	20.4	D

Ontario table 1.(Continued).

				Nebraska (Cont d.)				
Neb.95.48-1	2	ML	2	0	2	3	17.7	D
Neb.107.52-1	2	ML	3	0	0	4	17.9	D
Neb.156.52-2	2	ML	2	0	0	5	17.9	D
Neb.131.50-2	2	L	2	0	0	5	19.4	D
Neb.181.51-2	2	L	2	0	0	3	19.8	D
Neb.215.50-2	2	L	2	0	0	4	19.6	R
Neb.226.19-1x	2	L	3	0	2	3	18.3	D
Neb.315.48-3x	2	L	2	0	0	5	19.4	R
				U.S.D.A				
B 605-10	2	ME	3	0	1	3	20.0	R
B 721-35	2	M.	3	0	2	6	17.5	D
B 922-6	2	M	4	0	0	3	19.0	D
B 3114-67	2	M	2	0	0	5	17.3	D
B 73-3	2	ML	4	0	1	2	20.0	D
B 3095-18	2	ML	3	0	2	3	18.7	D
B 3299-13	2	ML	2	0	0	4	18.7	D
B 2894-24	2	L	3	2	0	2	19.4	R
B 3309-2	2	L	2	0	0	4	14.9	D
				North Dakota				
ND 2774-3R	2	E	2	0	1	6	18.7	R
ND 3324-2	2	E	2	0	1	3	19.6	R
				New York				
Russet Cherokee	2	ML	3	0	0	5	19.6	R
Rukat	2	L	4	2	1	2	17.5	D
				Iowa				
I 911-2	1	E	1	0	0	3	20.8	R
				Nebraska				
Neb.156.48-2x	1	ME	1	0	3	6	17.5	R
Neb.315.48-2x	1	ME	2	0	2	5	20.0	R
Excel	1	M	1	0	2	5	19.4	R
				North Dakota				
F 29-1	1	VE	2	0	2	4	16.8	R
P 50.4-52-40	1	E	0	0	1	4	16.2	R
ND 3569-1Russ.	1	E	1	0	2	3	18.1	R
ND 3676-21Russ.	1	E	0	0	3	4	19.2	R

Ontario table 1. (Continued).

North Dakota (Contd.)

ND 2306-6 R	1	ME	2	0	2	4	17.0	R
ND 3307-2	1	ME	2	0	2	5	17.9	R
ND 3631-6 R	1	ME	1	0	2	3	15.2	R
ND 3707-1 R	1	ME	1	0	2	4	16.8	R
ND 2555-12 R	1	M	1	0	2	5	16.8	R
ND 3023-B-10 R	1	M	2	0	1	3	17.7	R
ND 3631-5 R	1	M	0	0	2	3	17.0	R
ND 144-106 R	1	ML	2	0	1	4	18.7	D
ND 2128-20	1	ML	2	0	2	3	19.8	R
ND 2231-1	1	L	2	0	1	3	17.5	D

U.S.D.A.

B 920-7	1	E	1	0	2	5	18.1	R
B 3309-4	1	E	2	0	1	4	16.2	R
B 3397-17	1	M	2	0	2	4	17.7	R
B 69-16	1	ML	2	2	3	4	19.0	R
B 1339-12	1	ML	2	0	2	3	17.9	R
B 2368-4	1	ML	2	0	1	3	18.1	R
B 3309-8	1	ML	1	0	0	3	16.4	R
B 3319-30	1	ML	2	0	2	4	17.7	R
B 3391-2	1	ML	1	0	2	4	17.5	R
B 3653-15	1	ML	2	0	2	6	16.4	D
B 3692-4	1	ML	2	0	2	3	17.9	R
B 3556-11	1	VL	2	0	0	3	21.7	R
L.A.1859	1	M	2	0	2	5	17.9	R
X 927-3	1	L	2	0	3	4	19.4	R

Wisconsin

Wisc.X 137.52	1	E	0	0	1	5	19.2	R
Wisc.AG 120	1	M	2	0	2	3	19.2	R
Wisc.0112	1	M	1	0	2	7	20.4	R
Wisc.AG 29	1	ML	0	0	0	3	18.1	R
Wisc.0103	1	ML	1	0	2	6	17.3	R
Wisc.M 804	1	VL	2	0	1	3	17.9	R

<u>Tuber Disease Ratings</u>:

0 - none
1 - trace
2 - 1 to 5% of tuber surface
3 - 6 to 10
4 - 11 to 20
5 - 21 to 30
6 - 31 to 40%
7 - 41 to 50
8 - 51 to 75
9 - 76 to 100

Ontario table 2. Replicated adaptation trial conducted at the Potato Experiment Station, Guelph, Ontario, 1958.

Seedling or Variety	Years Tested	Maturity	Marketable Yield		Total Solids	Cooking Quality Tex. (10)	Flav. (10)	Col. (10)	D or R
			Bu.	Pct.	Pct.				
G 2820-3	4	VE	505	90	18.1	7	9	9	R
Irish Cobbler	Std.	E	452	85	19.4	8	9	8	R
Norland	2	E	530	88	17.7	6	9	8	R
F 5145	5	E	350	76	20.0	8	8	9	D
Haig	3	ME	429	79	19.2	6	8	7	R
F 5157	5	ME	477	84	19.6	7	8	7	D
F 5159	5	ME	405	87	20.4	7	9	8	D
G 2805-2	4	ME	381	83	22.8	10	9	10	R
G 2818-4	4	ME	508	90	18.5	8	8	8	D
Antigo	3	M	470	91	18.5	7	8	8	D
Redbake	3	M	346	79	18.7	9	9	7	R
Red Beauty	3	M	479	81	18.3	7	9	8	R
G 2500-8	7	M	647	94	18.7	6	9	9	R
G 2803-1	4	M	334	82	23.4	9	9	9	R
G 2804-5	4	M	416	77	20.8	8	9	9	R
Red Kote	4	ML	423	79	17.0	6	9	8	D
Rukat	2	ML	613	91	17.5	5	8	9	D
F 1464-26	7	ML	442	82	19.6	8	8	8	R
F 4730	9	ML	433	82	17.5	6	9	8	D
Neb.91.47-1	3	ML	531	83	19.2	6	8	7	D
Katahdin	Std.	L	542	88	18.7	8	9	10	R
Merrimack	4	L	493	88	19.8	8	8	7	D
G 2645-6	6	L	335	83	22.8	9	9	9	R
G 2717-7	5	L	476	81	21.9	10	10	9	R
G 2805-5	4	L	378	77	23.0	9	9	10	R
G 2966-1	3	L	506	84	20.0	8	8	9	R
G 2719-97	5	VL	286	58	20.6	9	10	10	D

Ontario table 3. 1958. Ontario Regional Potato Variety Trials: Summary of the Marketable Yields in Hundredweights and Percent.

Variety	OAC		Ha.		Du.		Si.		Br.		Sm.		Mi.		Te.		Ka.		F.W.		Means	
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	pct.
Norgleam	243	85	156	63	152	84	120	90	313	91	201	93	190	80	130	86	126	71	113	71	174	81
Fundy	255	85	185	75	172	85	110	72	235	87	249	92	161	60	160	88	148	65	136	66	181	78
Irish Cobbler	287	85	231	80	165	75	126	77	244	82	292	88	228	73	104	62	149	61	83	47	191	73
Tawa	261	86	213	83	142	91	102	82	227	83	232	91	126	53	129	82	106	49	128	62	167	76
F 5080	208	80	114	88	125	87	98	89	171	88	268	97	172	80	109	84	109	73	212	93	159	86
F 4631	288	89	181	69	208	90	109	81	201	80	294	94	197	62	139	84	147	64	109	57	187	77
G 2213-175	313	91	241	74	258	90	152	86	191	78	331	93	220	68	187	86	201	68	194	73	229	81
Plymouth	229	85	328	91	181	87	139	85	173	72	313	95	220	67	131	81	101	54	155	67	197	78
F 4932	279	88	232	88	223	95	174	92	234	78	271	93	193	71	184	89	155	68	167	78	206	84
Delus	267	92	162	62	169	71	150	91	233	84	291	93	228	80	150	89	146	81	196	85	199	83
F 4949	296	86	187	70	214	95	144	83	208	83	331	94	186	62	158	88	153	67	135	64	201	79
Avon	337	90	220	86	204	87	138	89	247	82	286	93	271	75	178	86	138	63	118	54	214	80
Katahdin	265	86	241	77	187	72	201	95	140	69	288	94	226	70	140	78	155	64	155	67	200	77
Boone	342	88	222	75	203	89	198	88	91	63	413	92	251	76	180	80	127	62	202	84	223	80
Sebago	293	87	315	87	274	96	181	94	106	68	377	95	310	74	157	78	113	42	186	79	231	80
G 2505-37	351	92	242	77	232	87	178	83	123	68	396	93	216	69	164	78	128	62	173	78	220	79
L.S.D. - 5%	43		65		29		27		55		50		65		32		53		25			
Means	282	87	217	78	194	86	145	86	196	78	302	93	212	70	150	82	138	63	154	70		

OAC - Guelph (Potato Exp. Farm). Ha. - Harrow Exp. Sta. Du. - Dufferin Co. Si. - Simcoe Co. Br. - Bradford Muckland Exp. Sta. Sm. - Smithfield Exp. Sta. Mi. - Mindemoya Illus. Sta. Te. - Temiskaming Dist. Ka. - Kapuskasing Exp. Sta. F.W. - Fort William Illus. Sta.

Ontario table 4. Ontario Regional Potato Variety Trials: Summary of the Total Solids Content in Percent, 1958.

Variety	Maturity	OAC	Ha.	Du.	Si.	Br.	Sm.	Mi.	Te.	Ka.	F.W.	Means
Norgleam	VE	17.9	16.6	19.2	18.3	15.4	17.9	20.0	16.2	17.0	20.4	17.9
Fundy	E	19.6	17.9	20.2	19.4	16.0	18.7	20.6	17.3	18.7	20.8	18.9
Irish Cobbler	E	20.0	18.1	19.0	18.5	15.6	18.7	20.8	18.3	19.2	20.2	18.8
Tawa	ME	18.5	17.0	19.0	18.3	16.2	18.7	20.6	16.4	19.2	19.4	18.3
F 5080	M	21.1	17.0	21.3	22.1	15.8	20.6	22.5	18.1	19.4	21.1	19.9
F 4631	M	18.1	16.6	18.5	18.3	16.6	18.3	19.6	17.3	18.5	19.4	18.1
G 2213-175	ML	18.7	17.7	17.9	17.3	14.5	18.3	19.0	16.2	17.7	18.5	17.6
Plymouth	ML	19.4	17.3	18.5	18.5	15.6	19.0	20.6	17.0	18.7	20.0	18.5
F 4932	ML	20.0	17.5	20.2	19.6	16.2	19.4	20.8	17.5	18.5	19.8	19.0
Delus	ML	21.5	17.9	21.3	21.1	17.5	21.3	22.8	19.8	19.6	21.3	20.4
F 4949	ML	18.7	16.2	19.0	18.7	15.4	18.1	20.2	16.8	18.1	19.6	18.1
Avon	L	19.6	16.8	18.7	19.4	15.6	19.6	20.6	17.0	19.6	19.8	18.7
Katahdin	L	18.5	16.4	19.4	20.0	14.3	18.3	20.8	16.8	18.3	19.8	18.3
Boone	VL	18.3	15.8	17.5	17.9	13.2	18.5	21.1	17.5	18.3	17.7	17.6
Sebago	VL	19.8	16.8	18.7	19.4	13.5	19.0	21.1	17.5	18.5	17.5	18.2
G 2505-37	VL	21.9	19.8	20.8	21.3	17.3	22.5	22.5	19.0	19.6	20.6	20.5
Means		19.5	17.2	19.3	19.2	15.5	19.2	20.8	17.4	18.8	19.7	

OAC - Guelph (Potato Exp. Farm). Ha. - Harrow Exp. Sta. Du. - Dufferin Co. Si. - Simcoe Co.
Br. - Bradford Muckland Exp. Sta. Sm. - Smithfield Exp. Sta. Mi. - Mindemoya Illus. Sta.
Te. - Temiskaming Dist. Ka. - Kapuskasing Exp. Sta. F.W. - Fort William Illus. Sta.

Ontario table 5. Ontario Regional Potato Variety Trials: Summary of the Cooking Trials Conducted on Tuber Samples, 1958.

VARIETY	TEXTURE										FLAVOR										COLOR										MEANS			C.P. INDEX (100)
	1	2	3	4	5	6	7	8	9	10*	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	T.	F.	C.	
Norgleam	8	5	7	6	5	7	7	6	6	7	9	9	10	10	9	8	9	8	8	9	10	9	9	10	9	10	10	9	9	10	6	9	10	83
Fundy	8	7	8	7	5	8	9	6	7	7	9	9	9	9	8	9	9	8	9	8	7	9	7	9	9	8	8	7	8	8	7	9	8	80
I.Cobbler	10	6	8	7	5	8	9	7	7	7	9	9	9	9	8	9	9	9	8	8	8	7	8	9	10	8	8	10	8	7	7	9	8	81
Tawa	8	5	7	5	4	6	8	5	7	6	9	9	8	8	8	9	8	8	8	8	6	9	6	8	9	8	8	8	6	7	6	8	8	73
F 5080	9	5	8	7	6	9	9	6	7	6	9	8	8	9	9	9	8	8	8	8	6	8	9	8	10	9	7	9	7	8	7	8	8	79
F 4631	7	5	8	6	4	7	8	5	7	7	9	9	8	8	8	9	9	8	8	9	5	8	5	8	10	8	8	8	7	6	6	8	7	74
G2213-175	8	4	6	5	4	7	7	4	5	9	8	8	8	8	8	8	8	8	7	8	8	8	4	8	9	7	6	7	6	7	5	8	7	68
Plymouth	7	4	6	7	4	7	8	6	6	5	7	7	8	9	8	9	8	8	7	7	7	7	6	9	9	6	5	7	5	7	6	8	7	69
F 4932	8	5	7	7	6	8	8	6	8	7	9	8	8	9	9	9	9	8	8	8	8	9	6	8	10	9	9	8	8	7	7	8	8	79
Delus	9	5	8	7	6	9	8	7	7	7	9	8	9	9	9	9	8	8	8	9	9	9	9	10	9	9	8	9	8	8	7	9	9	82
F 4949	7	4	6	6	4	6	7	6	6	7	9	8	8	9	8	8	9	8	8	9	5	8	7	8	8	7	8	6	5	7	6	8	7	71
Avon	8	4	6	6	5	8	7	5	6	6	9	8	8	8	9	9	8	8	8	8	7	10	9	9	10	8	8	8	7	10	6	8	9	76
Katahdin	8	5	8	8	5	8	7	6	5	6	9	8	8	9	8	9	8	8	8	8	7	9	9	8	10	8	8	8	8	8	7	8	8	77
Boone	8	3	6	6	3	7	6	4	5	4	9	8	7	8	7	8	8	7	7	8	8	9	8	9	9	9	8	8	8	9	5	8	9	71
Sebago	9	5	7	7	4	7	8	6	7	5	10	9	9	10	8	9	9	8	8	8	9	10	8	9	10	9	10	10	10	10	6	9	10	83
G2505-37	9	7	8	8	7	9	8	6	6	5	10	9	8	8	9	8	8	8	9	7	8	9	7	8	9	8	6	8	10	8	7	8	8	79
MEANS	8	5	7	7	5	8	8	6	6	6	9	8	8	9	8	9	8	8	8	8	7	9	7	9	9	8	8	8	8	8	6	8	8	77

*1 - O.A.C., Guelph. 2 - Harrow Exp. Sta. 3 - Dufferin Co. 4 - Simcoe Co. 5 - Bradford Muckland Sta.
6 - Smithfield Exp. Sta. 7 - Mindemoya Ill. Sta. 8 - Temiskaming Dist. 9 - Kapuskasing Exp. Sta.
10 - Fort William Sta.

°Consumer Preference Index - Percent of actual score to possible.

RATINGS: 10 - most desirable; 1-least desirable
5 or less - consumer acceptance questionable.

MEXICO

John S. Niederhauser

Report For 1957 Toluca (Mexico) Field test for Late Blight Resistance on USDA seedlings (segregating population) sent by Mr. Robert Akeley

Planted: May 23, 1958.

Planting plan: Small, whole tubers, planted 50 cm. apart in row, 30 plants per row. Check variety Alpha was planted after every 10 plants.

Seedlings, representing 23 families were planted in the field at the Santa Elena Experiment Station near Toluca.

Cultural Methods: Fertilizer applied at time of rowing out, 1.0 tons of 6-12-3 formula. No fungicides were applied during the entire season. DDT was applied 3 times (about 2.5 Kg of 75% wettable powder per hectarea) and 2 applications of parathion were made.

Seasonal notes: Late blight was severe, and appeared early. First blight lesions were noted in plots in June 19. Check variety Alpha was completely dead on July 25.

Same blight scale was used as in previous years: 0, no infection; 1, very few lesions (1-5); 2, slight infection; 3, moderately blighted (up to 50% foliage); 4, severely blighted; 5, dead.

Mexico table 1. Field test for late blight resistance, USDA seedlings, Toluco, Mexico, 1958.

USDA No.	Planted	Virus Rogued	Read	Late Blight Readings (Aug. 15, 1958) 0	1	2	3	4	5
	No.	No.	No.						
B 4504	114	5	104				6	19	79
B 4505	90	2	80					2	78
B 4506	210	4	189			1	4	5	179
B 4507	164	-	145				3	3	139
B 4508	63	1	55			1	5	10	39
B 4509	214	1	203					3	200
B 4510	105	-	91				1	1	89
B 4511	390	5	364				1	4	360
B 4512	184	6	172					4	168
B 4513	21	3	16					1	15
B 4514	17	-	16					1	15
B 4515	25	-	25						25
B 4516	44	1	43			1	8	17	17
B 4517	195	5	180				1	27	152
B 4536	54	1	49			2	2	12	33
B 4537	99	-	93					3	90
B 4544	111	6	93				2	4	87
B 4548	228	1	219			12	53	70	74
B 4549	132	-	125			1	2	23	99
B 4550	150	-	149						149
B 4551	50	-	46				7	7	32
B 1547	46	1	43						43
B 1560	104	4	97				14	48	45

SOUTH AFRICA (PRETORIA)

J. E. Van Der Plank

South Africa has received many new American lines over the past 12 years. The most successful and the only one so far to be taken up commercially on a fair scale is Kennebec. Indeed, from the 4 tubers sent by Dr. F. J. Stevenson from Beltsville as B70-5, Kennebec was multiplied twice a year and put into production here before it was named and released in the United States.

Apart from Kennebec most interest has been given to leafroll resisters. Our experience has been patchy. B24-58, B24-78, and X 1276-185 have been outstanding and widely used in our breeding program. But X927-3 and B936-12, which seem to have been much used as parents in the United States, went down quickly to leafroll under field conditions here.

Our aim has been to get adequate resistance to all the insect-borne viruses rather than very great resistance to any one of them. It is possible to overdo work on resistance and to discard so many seedlings while screening for virus resistance that too few remain for selection as potential commercial varieties. On our experience here we would, e.g. regard Katahdin and Kennebec as adequately resistant to virus Y. We have never had any real trouble in them from this virus in the field. What more can one want?

So far, a great lack in our breeding program has been adequate resistance to rootknot nematodes (Meloidogyne spp.). If anyone has resistant material I should be glad to hear of it.